Cornell University Officers of the Corporation

David J. Skorton, president
Carolyn A. (Biddy) Martin, provost
Antonio M. Gotto Jr., provost for medical affairs
Stephen T. Golding, executive vice president of finance and administration
James J. Mingle, university counsel and secretary of the corporation

Vice Presidents, Vice Provosts, and Dean of Faculty

Carolyn N. Ainslie, vice president for planning and budget
Thomas W. Bruce, vice president for communications and media relations
Stephen P. Johnson, vice president for government relations
Polley Ann McClure, vice president for information technologies
Susan H. Murphy, vice president for student and academic services
Mary George Opperman, vice president for human resources
Charles D. Phleger, vice president for alumni affairs and development
Joanne M. DeStefano, vice president for financial affairs
William E. Fry, dean of the university faculty
David R. Harris, deputy provost
Stephen Kresovich, vice provost
Michele A. Moody-Adams, vice provost
Alan S. Paau, vice provost
Robert A. Buhrman, vice provost
Ronald Seeber, vice provost
John A. Siliciano, vice provost

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/biasresponse.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. 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. Cornell Policy 607 255-1111

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: dsys1@cornell.edu

Photography by CU Photography and Charles Harrington.
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 Paul Streeter, assistant vice president for planning and budget, Cornell University, 441 Day Hall, Ithaca, NY 14853-2801, ps33@cornell.edu.

Cornell University
(USPS 132-860)
Volume 100 of the series "Cornell University" consists of four catalogs, of which this is number three, dated August 1, 2008. Issued once in January, once in July, once in August, and once in November. Published by Cornell University, Publications and Marketing, East Hill Plaza, 353 Pine Tree Road, Ithaca, NY 14850–2820. Periodicals postage paid at Ithaca, New York.
Postmaster: Send address changes to Cornell University, Office of the University Registrar, B07 Day Hall, Ithaca, NY 14853–2801.
CONTENTS

Introduction 5
University Registration 5
Leaves and Withdrawals 5
Bursar Information 5
Tuition, Fees, and Expenses 5
Billing and Payment 6
Student Health Insurance 6
Student Records Privacy Statement: Annual Notification Under FERPA 6
Academic Integrity 7
Protection of Human Participants in Research 7
Use of Animals for Courses 7
Advanced Placement 8
Credit and Placement 8
Supplementary Information 8
Course Enrollment 12
Preenrollment 12
Course Add/Drop/Change 12
Auditing Courses 12
Explanation of Course Numbering Systems and Subject Codes 12
Class Attendance, Meeting Times, and Examinations 14
Class Attendance and Meeting Times 14
Final Examinations 14
Evening Preliminary Examinations 15
Grading Guidelines 15
S-U Grades 15
Incomplete 16
Changes in Grades 16
Official Transcripts 16
University Requirements for Graduation 16
Student Responsibilities 16
Physical Education 16
Internal Transfer Division 16
Interdisciplinary Centers, Programs, and Studies 17
Andrew D. White Professors-at-Large 17
Frank H. T. Rhodes Class ’56 University Professorship 17
Center for Applied Mathematics 17
The Mario Einaudi Center for International Studies 18
Center for the Study of Inequality 19
Cognitive Science 19
Cornell Abroad 19
Cornell in Washington Program 22
Cornell Institute for Public Affairs 22
Cornell Plantations 23
Program on Ethics and Public Life 24
Program in Real Estate 24
Science of Earth Systems: An Intercollege Major 24
Business and Preprofessional Study 25
Undergraduate Business Study 25
Combined Degree Programs 26
Prelaw Study 26
Premedical Study 26
Preveterinary Study 26
College of Agriculture and Life Sciences 28
Introduction 28
Degree Programs 30
Opportunities in Research 31
Off-Campus Opportunities 35
Graduation Requirements for the Bachelor of Science 36
Academic Policies and Procedures 39
Major Fields of Study 41
Description of Courses 54
Interdepartmental/Intercollege Courses 55
Nondepartmental Courses 57
Applied Economics and Management 58
Animal Science 66
Biological and Environmental Engineering 69
Biometry and Statistics 74
Communication 77
Crop and Soil Sciences 81
Development Sociology 85
Earth and Atmospheric Sciences 88
Education 94
Entomology 98
Food Science 100
Horticulture 104
Information Science 108
International Agriculture and Rural Development 109
Landscape Architecture 110
Natural Resources 113
Plant Breeding and Genetics 117
Plant Pathology and Plant-Microbe Biology 119
Science of Natural and Environmental Systems 122
Faculty Roster 122
College of Architecture, Art, and Planning 126
Administration 126
Faculty Advisors 126
Degree Programs 126
Facilities 126
College Academic Policies 127
Architecture 128
Art 138
City and Regional Planning 145
Landscape Architecture 155
Faculty Roster 156
Biological Sciences 158
Organization 158
Distribution Requirement 158
Use of Animals in the Biological Sciences Curriculum: Cornell University 158
Advanced Placement 158
The Major 158
Curriculum Committee 163
Advising 163
Transferring Credit 163
General Courses 165
Animal Physiology 165
Biochemistry, Molecular and Cell Biology 166
Ecology and Evolutionary Biology 168
Genetics and Development 172
Microbiology 175
Neurobiology and Behavior 177
Plant Biology 180
Courses in Marine Science 184
Shoals Marine Laboratory 185
Faculty Roster 189
Computing and Information Science 192
Administration 192
Introduction 192
Academic Programs 192
The Information Science Minor 193
Computing and Information Science Courses 194
Computer Science 195
Information Science 200
Department of Statistical Science 202
Faculty Roster 203
Johnson Graduate School of Management 370

Law School 382

Division of Nutritional Sciences 397
Administration 397
The Division 397
Facilities 397
Undergraduate Programs 397
The Curriculum 397
Career Options and Course Planning 397
Special Experiences 398
Independent Study Electives 398
Honors Program 398
Courses Recommended for Nonmajors 398
Graduate Programs 398
Courses 398
Faculty Roster 403

Officer Education 404
Military Science 404
Naval Science 405
Department of Aerospace Studies 407

Department of Athletics and Physical Education 410
Administration 410
Courses 410

College of Veterinary Medicine 417

College of Arts and Sciences 436
Administration 436
Program of Study 436
Special Academic Options 442
Academic Integrity 444
Advising 444
Registration and Course Scheduling 445
Grades 446
Academic Standing 446
Graduation 447
Calendar Supplement 448
Africana Studies and Research Center 448
American Studies 452
Anthropology 458
Archaeology 465
Asian Studies 468
Asian American Studies Program 481
Astronomy 482
Biological Sciences 487
Biology & Society Major 487
Center for Applied Mathematics 494
Chemistry and Chemical Biology 494
China and Asia-Pacific Studies 500
Classics 501
Cognitive Science Program 507
College Scholar Program 514
Comparative Literature 514
Computer Science 518
Computing in the Arts Undergraduate Minor 521
Earth and Atmospheric Sciences 522
East Asia Program 528
Economics 528
English 534
English for Academic Purposes 544
European Studies Minor 544
Feminist, Gender & Sexuality Studies 545
German Studies 548
Government 553

History 563
History of Art 575
Human Biology Program 580
Independent Major Program 582
Inequality Minor 582
Information Science 584
International Relations Minor 587
Program of Jewish Studies 589
John S. Knight Institute for Writing in the Disciplines 590
Latin American Studies Program 592
Latino Studies Program 593
Law and Society 594
Lesbian, Bisexual, and Gay Studies 596
Linguistics 597
Mathematics 601
Medieval Studies 610
Music 612
Near Eastern Studies 618
Philosophy 624
Physics 627
Psychology 633
Religious Studies Major 641
Romance Studies 643
Russian 653
Science & Technology Studies 657
Society for the Humanities 663
Sociology 664
South Asia Program 670
Southeast Asia Program 670
Theatre, Film, and Dance 670
Visual Studies Undergraduate Concentration 685
Faculty Roster 686

Index 695

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 2008 and spring 2009.
All area codes are 607 unless otherwise specified.
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, 255-8920, gradschool.cornell.edu, gradschool.cornell.edu.


College of Veterinary Medicine, Office of Student and Academic Services, Cornell University, Schuman Hall, Ithaca, NY 14853-6401, 255-3700, www.vet.cornell.edu/prospective.htm.

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

A leave of absence must be requested from the college in which the student is enrolled. A leave of absence is granted for a specified time, after which the student is expected to return to resume course work. Students should inform their college of intent to return. 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 2008–2009

Endowed Divisions

Undergraduate

Architecture, Art, and Planning

Arts and Sciences

Engineering

Hotel Administration $36,500

Graduate

Graduate School with chair in an endowed college $29,500

Johnson Graduate School of Management $44,950

Professional

Law School

entering students $46,670

second-year students $45,800

third-year students $44,850

Contract Divisions (tuition rates are tentative)

Undergraduate

Agriculture and Life Sciences

Human Ecology

Industrial and Labor Relations

New York State resident* $20,160

Nonresident DVM $57,100

Graduate, Ph.D. $20,800

Student Activities Fee (Tentative)

Undergraduate students $204

Graduate and professional students $70

Summer Session (2008)

$925 per credit*

In Absentia Fees

Undergraduate $15 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 2008 semester is June 1, 2008. The deadline for the Spring 2009 semester is November 1, 2008. 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 2008 and Spring 2009

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Fall 2008</th>
<th>Spring 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>no charge</td>
<td>8/26–9/2</td>
<td>1/15–1/21</td>
</tr>
<tr>
<td>10% charge</td>
<td>9/3–9/9</td>
<td>1/22–1/28</td>
</tr>
<tr>
<td>20% charge</td>
<td>9/10–9/23</td>
<td>1/20–2/11</td>
</tr>
<tr>
<td>30% charge</td>
<td>9/24–9/30</td>
<td>2/12–2/18</td>
</tr>
<tr>
<td>40% charge</td>
<td>10/1–10/7</td>
<td>2/19–2/25</td>
</tr>
<tr>
<td>50% charge</td>
<td>10/8–10/14</td>
<td>2/26–3/4</td>
</tr>
<tr>
<td>60% charge</td>
<td>10/15–10/21</td>
<td>3/5–3/11</td>
</tr>
<tr>
<td>80% charge</td>
<td>10/22–10/28</td>
<td>3/12–3/18</td>
</tr>
<tr>
<td>100% charge</td>
<td>10/29</td>
<td>3/19</td>
</tr>
</tbody>
</table>

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.

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. 255-2536; fax 255-6442; uco-bursar@cornell.edu; www.bursar.cornell.edu). Bursar account information may be viewed real time on Just the Facts/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 midway may be eligible to purchase the Early Grad Plan. Those enrolled in the SHIP may enroll their eligible dependents for an additional cost (full 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).

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 responsibilities.

b. Upon request, to officials of another school in which a student seeks or intends to enroll.

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 (under personal information) on Just the Facts/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 Just the Facts/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

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 the College of Arts and Sciences 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, staff, and students 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 on their website.

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/AUHSPRiskAssessmentForm.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 set 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.

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 departmental examination as demonstrated by consultation between the student, his or her advisor, and the professors teaching the courses.

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. It 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 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 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 these 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 registrar's 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

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.

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 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, students must sign up beforehand in the Chemistry and Chemical Biology Instructional Office, 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 C50 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 signup is not necessary.

CREDIT AND PLACEMENT

The tables on the following pages summarize how credit and placement are determined for most subjects. Supplementary information for some subjects follows immediately.
<table>
<thead>
<tr>
<th>Subject</th>
<th>Score</th>
<th>Advanced Placement (AP) Credit</th>
<th>Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabic</td>
<td></td>
<td></td>
<td>Department of Near Eastern Studies determines credit and placement based</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>on departmental examination.</td>
</tr>
<tr>
<td>Biology</td>
<td></td>
<td></td>
<td>see <a href="http://www.biology.cornell.edu">www.biology.cornell.edu</a> for credit and placement information.</td>
</tr>
<tr>
<td>Chemistry</td>
<td>5</td>
<td>4 credits</td>
<td>Department determines placement on basis of student/advisor meeting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>before registration and/or an exam given during fall orientation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Placement out of 1560, 2070, or 2090; if students take 2150 they may also</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>receive 4 AP credits.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pre-med students with AP credit should contact the Health Careers Center</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>to determine how many general chemistry courses they should take. A few</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>medical schools require two semesters of general chemistry; they do not</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>accept AP credit as one of the required courses.</td>
</tr>
<tr>
<td>Computer science AB</td>
<td>4,5</td>
<td>4 credits</td>
<td>Placement out of CS 1100. Department offers placement exam during fall</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>orientation.</td>
</tr>
<tr>
<td>Computer science A</td>
<td>5</td>
<td>4 credits</td>
<td>Placement out of CS 1100. Department also offers placement exam during</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>fall orientation.</td>
</tr>
<tr>
<td>Economics, micro</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of ECON 1110 and HADM 1141.</td>
</tr>
<tr>
<td>Economics, macro</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of ECON 1120.</td>
</tr>
<tr>
<td>English literature and composition</td>
<td></td>
<td></td>
<td>varies by college</td>
</tr>
<tr>
<td>English language and composition</td>
<td></td>
<td></td>
<td>varies by college</td>
</tr>
<tr>
<td>Environmental science</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of EAS 1101 or 1110 and NTRES 2010. (Engineering and BEE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>students receive no credit.)</td>
</tr>
<tr>
<td>French language</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of Romance Studies determines placement. Students should take</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the CASE† to obtain appropriate placement.</td>
</tr>
<tr>
<td>French literature</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of Romance Studies determines placement. Students should take</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the CASE† to obtain appropriate placement.</td>
</tr>
<tr>
<td>German</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of German Studies determines credit and placement. Students</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>should take the CASE† to obtain appropriate placement.</td>
</tr>
<tr>
<td>Government and politics, U.S.</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of GOVT 1111.</td>
</tr>
<tr>
<td>Government and politics, comparative</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of GOVT 1313.</td>
</tr>
<tr>
<td>Greek, Ancient</td>
<td></td>
<td></td>
<td>Department of Classics determines credit and placement based on</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>departmental examination.</td>
</tr>
<tr>
<td>Greek, Modern</td>
<td></td>
<td></td>
<td>Department of Classics determines credit and placement based on</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>departmental examination.</td>
</tr>
<tr>
<td>Hebrew</td>
<td></td>
<td></td>
<td>Department of Near Eastern Studies determines credit and placement based</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>on departmental examination.</td>
</tr>
<tr>
<td>American history</td>
<td>4,5</td>
<td>4 credits</td>
<td>Placement out of HIST 1530 (also AMST 1530) and 1531 (also AMST 1531).</td>
</tr>
<tr>
<td>European history</td>
<td>4,5</td>
<td>4 credits</td>
<td>Placement out of HIST 1510 and 1520.</td>
</tr>
<tr>
<td>Human geography</td>
<td></td>
<td>no credit</td>
<td>Department of Romance Studies determines placement. Students should take</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the CASE† to obtain appropriate placement.</td>
</tr>
<tr>
<td>Italian language</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of Romance Studies determines placement. Students should take</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the CASE† to obtain appropriate placement.</td>
</tr>
<tr>
<td>Italian literature</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of Romance Studies determines placement. Students should take</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the CASE† to obtain appropriate placement.</td>
</tr>
<tr>
<td>Latin</td>
<td></td>
<td></td>
<td>Department of Classics determines credit and placement based on</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>departmental examination.</td>
</tr>
<tr>
<td>Subject</td>
<td>Score</td>
<td>Advanced Placement Credit</td>
<td>Placement</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------</td>
<td>----------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Mathematics BC</td>
<td>4,5</td>
<td>8 credits</td>
<td>Placement out of MATH 1106, 1110, 1120, 1220, and 1910. Students wishing to take engineering calculus will place into MATH 1920.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4 credits</td>
<td>Placement out of MATH 1106 and 1110. Permission to take MATH 1120, 1220, 1910, or 2310.</td>
</tr>
<tr>
<td>Mathematics AB or AB</td>
<td>3,4,5</td>
<td>4 credits</td>
<td>Placement out of MATH 1106 and 1110. Permission to take MATH 1120, 1220, 1910, or 2310.</td>
</tr>
<tr>
<td>subscore of BC exam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td></td>
<td>Department of Music determines credit and placement based on departmental examination.</td>
</tr>
<tr>
<td>Persian</td>
<td></td>
<td></td>
<td>Department of Near Eastern Studies determines credit and placement based on departmental examination.</td>
</tr>
<tr>
<td>Physics B</td>
<td>5</td>
<td>8 credits</td>
<td>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 <a href="http://www.engineering.cornell.edu/student-services/academic-advising/academic-information/ap-credit/index.cfm">www.engineering.cornell.edu/student-services/academic-advising/academic-information/ap-credit/index.cfm</a> for credit and placement information.</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>4 credits</td>
<td>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].)</td>
</tr>
<tr>
<td>Physics C–Mechanics</td>
<td>4,5</td>
<td>4 credits</td>
<td>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].)</td>
</tr>
<tr>
<td>Physics C–Electricity/</td>
<td>5</td>
<td>4 credits</td>
<td>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].)</td>
</tr>
<tr>
<td>Magnetism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychology</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of PSYCH 1101.</td>
</tr>
<tr>
<td>Spanish language</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of Romance Studies determines placement. Students should take the CASE† to obtain appropriate placement.</td>
</tr>
<tr>
<td>Spanish literature</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of Romance Studies determines placement. Students should take the CASE† to obtain appropriate placement.</td>
</tr>
<tr>
<td>Statistics (excluding</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of AEM 2100, PAM 2100, ILRST/STSCI 2100, or MATH 1710 (not HADM 2201).</td>
</tr>
<tr>
<td>engineering students)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Studio art</td>
<td></td>
<td>no credit</td>
<td></td>
</tr>
<tr>
<td>Turkish</td>
<td></td>
<td></td>
<td>Department of Near Eastern Studies determines credit and placement based on departmental examination.</td>
</tr>
<tr>
<td>World history</td>
<td></td>
<td>no credit</td>
<td></td>
</tr>
</tbody>
</table>

†Cornell Advanced Standing Examination. Contact Callean Hile, 303 Morrill Hall, for French, Italian, and Spanish. Contact Miriam Zubal, 183 Goldwin Smith Hall, for German.
Mathematics exam should be taken by Calculus program. The Department of Mathematics offers a senior year. (Calculus AB or Calculus BC) during their CEEB's two Advanced Placement Examinations calculus should, if possible, take one of the had the equivalent of at least one semester of level. Secondary-school students who have has already been covered at an appropriate calculus courses given in many high schools, 1910 cover substantially the same topics as Calculus courses MATH 1110, 1120, and Courses.

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 of Mathematics exam should be taken by

<table>
<thead>
<tr>
<th>Subject</th>
<th>Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Baccalaureate (IB) Higher-Level Examinations</td>
<td></td>
<td>are awarded advanced standing and credit on receipt of the examination results from the I.B. Office.</td>
</tr>
<tr>
<td>Anthropology</td>
<td></td>
<td>subject to departmental review</td>
</tr>
<tr>
<td>Biology</td>
<td></td>
<td>see <a href="http://www.biology.cornell.edu">www.biology.cornell.edu</a></td>
</tr>
<tr>
<td>Chemical and Physical Systems</td>
<td>6 or 7</td>
<td>8 credits (PHYS 1101 and 1102)</td>
</tr>
<tr>
<td>Chemistry</td>
<td>6 or 7</td>
<td>4 credits (CHEM 2070 or 2090)</td>
</tr>
<tr>
<td>Computer Science</td>
<td>6 or 7</td>
<td>4 credits (CS 1110)</td>
</tr>
<tr>
<td>Economics</td>
<td>6 or 7</td>
<td>6 credits (ECON 1110 and 1120)</td>
</tr>
<tr>
<td>English Literature</td>
<td>7</td>
<td>3 credits and placement out of one first-year writing seminar</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6 or 7</td>
<td>4 credits and placement out of MATH 1106 and 1110. Students may obtain more credit by taking the Mathematics Department placement exam. (Engineering and BEE students receive no credit.)</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td>by departmental examination</td>
</tr>
<tr>
<td>Philosophy</td>
<td>7</td>
<td>3 credits</td>
</tr>
<tr>
<td>Physical Science</td>
<td>6 or 7</td>
<td>8 credits (4 credits, CHEM 2060; 4 credits, PHYS 1010)</td>
</tr>
<tr>
<td>Physics</td>
<td>6 or 7</td>
<td>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].)</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td></td>
<td>see <a href="http://www.biology.cornell.edu">www.biology.cornell.edu</a></td>
</tr>
<tr>
<td>Chemistry</td>
<td>A</td>
<td>8 credits (CHEM 2070 or 2090)</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>4 credits (CHEM 2070 or 2090)</td>
</tr>
<tr>
<td>Economics</td>
<td>A</td>
<td>6 credits (ECON 1110 and 1120)</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>3 credits (excluding Arts and Sciences students)</td>
</tr>
<tr>
<td>English Literature</td>
<td>A</td>
<td>3 credits and placement out of one first-year writing seminar</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>3 credits (excluding Arts and Sciences students)</td>
</tr>
<tr>
<td>Mathematics</td>
<td>A, B, or C</td>
<td>4 credits and placement out of MATH 1106 and 1110. Students may obtain more credit by taking the Mathematics Department placement exam. 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.)</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td>by departmental examination</td>
</tr>
<tr>
<td>Philosophy</td>
<td>A or B</td>
<td>3 credits</td>
</tr>
<tr>
<td>Physics</td>
<td>A or B</td>
<td>4 credits for PHYS 1101, 1112, or 2207. 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 116 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 <a href="http://www.engineering.cornell.edu/student-services/academic-advising/ap-credit/index.cfm">www.engineering.cornell.edu/student-services/academic-advising/ap-credit/index.cfm</a> for credit and placement information.</td>
</tr>
</tbody>
</table>

Mathematics and Statistics

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.

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. Students who have been awarded advanced placement credit for calculus or statistics may not also receive academic credit for similar courses taken at Cornell. Students who have been awarded AP credit for statistics (3 academic credits) will forfeit those credits if they take AEM 2100, ILRST/STSCI 2100, MATH 1710, or PAM 2100.

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 this 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 this 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 or statistics may not also receive academic credit for similar courses taken at Cornell. Students who have been awarded AP credit for statistics (3 academic credits) will forfeit those credits if
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 5 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 5 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 Calleen Hile, 305 Morrill Hall, for French, Italian, and Spanish (placement tests in French, Italian, and Spanish are available at coll.itc.cornell.edu); Miriam Zubal, 185 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 of two years’ credit is earned by 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, 101 Clark Hall (physicssdu@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 5 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 enrollment. 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, 101 Clark Hall, or from the Department of Physics, 109 Clark Hall.

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 Just the Facts/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

<table>
<thead>
<tr>
<th>Academic Unit</th>
<th>Late Course Enrollment Fee</th>
<th>Late Course Add/Drop/ Change Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuing Education and Summer Sessions</td>
<td>$100*</td>
<td>$100*</td>
</tr>
<tr>
<td>Johnson Graduate School of Management</td>
<td>No fee</td>
<td>No fee</td>
</tr>
<tr>
<td>Law School</td>
<td>$30</td>
<td>$20*</td>
</tr>
<tr>
<td>Veterinary medicine</td>
<td>$100*</td>
<td>$100*</td>
</tr>
</tbody>
</table>

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

*Consult the college office for special considerations and requirements.

AUDITING COURSES
Summer school and extramural students may officially register as visitors (auditors) in courses and have this entered on their permanent records if their attendance is reported as satisfactory. Graduate students may register for courses as auditors but will not have the courses listed on their transcripts. Undergraduates may not register to audit courses.

EXPLANATION OF COURSE NUMBERING SYSTEMS AND SUBJECT CODES
In 2008 the university moved to a 4-digit course numbering system; some subject codes also changed. If you are having difficulty finding a course for which you know only the former 3-digit course number, you may be able to locate the course and its corresponding 4-digit number in the 2007–08 Courses of
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

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAP</td>
<td>Architecture, Art, and Planning</td>
</tr>
<tr>
<td>AAS</td>
<td>American Asian Studies</td>
</tr>
<tr>
<td>AEM</td>
<td>Applied Economics and Management</td>
</tr>
<tr>
<td>AEP</td>
<td>Applied and Engineering Physics</td>
</tr>
<tr>
<td>AGSC</td>
<td>Agricultural Sciences</td>
</tr>
<tr>
<td>AIRS</td>
<td>Aerospace Studies</td>
</tr>
<tr>
<td>AIS</td>
<td>American Indian Studies</td>
</tr>
<tr>
<td>ALS</td>
<td>Agriculture and Life Sciences</td>
</tr>
<tr>
<td>AMST</td>
<td>American Studies</td>
</tr>
<tr>
<td>ANSC</td>
<td>Animal Science</td>
</tr>
<tr>
<td>ANTHR</td>
<td>Anthropology</td>
</tr>
<tr>
<td>ARCH</td>
<td>Architecture</td>
</tr>
<tr>
<td>ARCEO</td>
<td>Archaeology</td>
</tr>
<tr>
<td>ART</td>
<td>Art</td>
</tr>
<tr>
<td>ARTH</td>
<td>History of Art</td>
</tr>
<tr>
<td>ASIAN</td>
<td>Asian Studies</td>
</tr>
<tr>
<td>ASRC</td>
<td>Africana Studies and Research Center</td>
</tr>
<tr>
<td>ASTRO</td>
<td>Astronomy</td>
</tr>
<tr>
<td>BEE</td>
<td>Biological and Environmental Engineering</td>
</tr>
<tr>
<td>BENGL</td>
<td>Bengali</td>
</tr>
<tr>
<td>BIOAP</td>
<td>Animal Physiology and Anatomy</td>
</tr>
<tr>
<td>BIOBM</td>
<td>Biochemistry, Molecular and Cell Biology</td>
</tr>
<tr>
<td>BIOEE</td>
<td>Ecology and Evolutionary Biology</td>
</tr>
<tr>
<td>BIOG</td>
<td>Biology: General Courses</td>
</tr>
<tr>
<td>BIOGD</td>
<td>Genetics and Development</td>
</tr>
<tr>
<td>BIOMB</td>
<td>Environmental Science Marine Biology Laboratory</td>
</tr>
<tr>
<td>BIOMI</td>
<td>Microbiology</td>
</tr>
<tr>
<td>BIONB</td>
<td>Neurobiology and Behavior</td>
</tr>
<tr>
<td>BIOPL</td>
<td>Plant Biology</td>
</tr>
<tr>
<td>BIOSM</td>
<td>Shands Marine Laboratory</td>
</tr>
<tr>
<td>BME</td>
<td>Biomedical Engineering</td>
</tr>
<tr>
<td>BSOC</td>
<td>Biology and Society</td>
</tr>
<tr>
<td>BTRY</td>
<td>Biometry and Statistics</td>
</tr>
<tr>
<td>BURY</td>
<td>Burmese</td>
</tr>
<tr>
<td>CAPS</td>
<td>China and Asia Pacific Studies</td>
</tr>
<tr>
<td>CATAL</td>
<td>Catalan</td>
</tr>
<tr>
<td>CEE</td>
<td>Civil and Environmental Engineering</td>
</tr>
<tr>
<td>CHEM</td>
<td>Chemistry</td>
</tr>
<tr>
<td>CHEME</td>
<td>Chemical and Biomolecular Engineering</td>
</tr>
<tr>
<td>CHIN</td>
<td>Chinese</td>
</tr>
<tr>
<td>CHLIT</td>
<td>Literature in Chinese</td>
</tr>
<tr>
<td>CIS</td>
<td>Computing and Information Science</td>
</tr>
<tr>
<td>CLASS</td>
<td>Classics</td>
</tr>
<tr>
<td>COGST</td>
<td>Cognitive Science</td>
</tr>
<tr>
<td>COML</td>
<td>Comparative Literature</td>
</tr>
<tr>
<td>COMM</td>
<td>Communication</td>
</tr>
<tr>
<td>CRP</td>
<td>City and Regional Planning</td>
</tr>
<tr>
<td>CS</td>
<td>Computer Science</td>
</tr>
<tr>
<td>CSS</td>
<td>Crop and Soil Sciences</td>
</tr>
<tr>
<td>CZECH</td>
<td>Czech</td>
</tr>
<tr>
<td>DANIE</td>
<td>Dance</td>
</tr>
<tr>
<td>DEA</td>
<td>Design and Environmental Analysis</td>
</tr>
<tr>
<td>DSOCS</td>
<td>Development Sociology</td>
</tr>
<tr>
<td>DUTCH</td>
<td>Dutch</td>
</tr>
<tr>
<td>EAS</td>
<td>Earth and Atmospheric Sciences</td>
</tr>
<tr>
<td>ECE</td>
<td>Electrical and Computer Engineering</td>
</tr>
<tr>
<td>ECON</td>
<td>Economics</td>
</tr>
<tr>
<td>EDUC</td>
<td>Education</td>
</tr>
<tr>
<td>ENGL</td>
<td>English</td>
</tr>
<tr>
<td>ENGLF</td>
<td>English for Academic Purposes</td>
</tr>
<tr>
<td>ENGR</td>
<td>Engineering Communications</td>
</tr>
<tr>
<td>ENGRD</td>
<td>Engineering Distribution Courses</td>
</tr>
<tr>
<td>ENGBG</td>
<td>Engineering General Interest</td>
</tr>
<tr>
<td>ENGRH</td>
<td>Introduction to Engineering Courses</td>
</tr>
<tr>
<td>ENTOH</td>
<td>Entomology</td>
</tr>
<tr>
<td>FDSC</td>
<td>Food Science</td>
</tr>
<tr>
<td>FGSS</td>
<td>Feminist, Gender, and Sexuality Studies</td>
</tr>
<tr>
<td>FILM</td>
<td>Film Studies</td>
</tr>
<tr>
<td>FRDR</td>
<td>Freehand Drawing and Scientific Illustration</td>
</tr>
<tr>
<td>FREN</td>
<td>French</td>
</tr>
<tr>
<td>FSAD</td>
<td>Fiber Science and Apparel Design</td>
</tr>
<tr>
<td>GERST</td>
<td>German Studies</td>
</tr>
<tr>
<td>GOVT</td>
<td>Government</td>
</tr>
<tr>
<td>GRAD</td>
<td>Graduate School</td>
</tr>
<tr>
<td>GREEK</td>
<td>Greek</td>
</tr>
<tr>
<td>HADM</td>
<td>Hotel Administration</td>
</tr>
<tr>
<td>HD</td>
<td>Human Development</td>
</tr>
<tr>
<td>HE</td>
<td>Human Ecology Interdepartmental</td>
</tr>
<tr>
<td>HINDI</td>
<td>Hindi</td>
</tr>
<tr>
<td>HIST</td>
<td>History</td>
</tr>
<tr>
<td>HORT</td>
<td>Horticulture</td>
</tr>
<tr>
<td>HUNGR</td>
<td>Hungarian</td>
</tr>
<tr>
<td>IARD</td>
<td>International Agriculture and Rural Development</td>
</tr>
<tr>
<td>ILRBC</td>
<td>Collective Bargaining, Labor Law, and Labor History</td>
</tr>
<tr>
<td>ILRHR</td>
<td>Human Resources Studies</td>
</tr>
<tr>
<td>ILRIC</td>
<td>International and Comparative Labor Relations</td>
</tr>
<tr>
<td>ILRID</td>
<td>Industrial and Labor Relations Interdepartmental</td>
</tr>
<tr>
<td>ILRLE</td>
<td>Labor Economics</td>
</tr>
<tr>
<td>ILROB</td>
<td>Organizational Behavior</td>
</tr>
<tr>
<td>ILRST</td>
<td>Social Statistics</td>
</tr>
<tr>
<td>INDO</td>
<td>Indonesian</td>
</tr>
<tr>
<td>INFO</td>
<td>Information Science</td>
</tr>
<tr>
<td>ITAL</td>
<td>Italian</td>
</tr>
<tr>
<td>JAPAN</td>
<td>Japanese</td>
</tr>
<tr>
<td>JAVA</td>
<td>Javanese</td>
</tr>
<tr>
<td>JPLIT</td>
<td>Literature in Japanese</td>
</tr>
<tr>
<td>JWST</td>
<td>Jewish Studies</td>
</tr>
<tr>
<td>KHMER</td>
<td>Khmer (Cambodian)</td>
</tr>
<tr>
<td>KOREA</td>
<td>Korean</td>
</tr>
<tr>
<td>KRLIT</td>
<td>Korean Literature</td>
</tr>
<tr>
<td>LA</td>
<td>Landscape Architecture (Agriculture and Life Sciences)</td>
</tr>
<tr>
<td>LANAR</td>
<td>Landscape Architecture (Architecture, Art, and Planning)</td>
</tr>
<tr>
<td>LATA</td>
<td>Latin American Studies</td>
</tr>
<tr>
<td>LATIN</td>
<td>Latin</td>
</tr>
<tr>
<td>LAW</td>
<td>Law</td>
</tr>
<tr>
<td>LING</td>
<td>Linguistics</td>
</tr>
<tr>
<td>LSP</td>
<td>Latino Studies Program</td>
</tr>
<tr>
<td>MAE</td>
<td>Mechanical and Aerospace Engineering</td>
</tr>
<tr>
<td>MATH</td>
<td>Mathematics</td>
</tr>
<tr>
<td>MEDVL</td>
<td>Medieval Studies</td>
</tr>
<tr>
<td>MILS</td>
<td>Military Science</td>
</tr>
<tr>
<td>MSE</td>
<td>Materials Science and Engineering</td>
</tr>
<tr>
<td>MUSIC</td>
<td>Music</td>
</tr>
</tbody>
</table>
Class Attendance, Meeting Times, and Examinations

CLASS ATTENDANCE AND MEETING TIMES

Students are expected to be present throughout each semester at all meetings of classes 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

<table>
<thead>
<tr>
<th>Day</th>
<th>Monday/Wednesday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Times</td>
<td>End Times</td>
</tr>
<tr>
<td>50 MIN</td>
<td>08:00 a.m.</td>
</tr>
<tr>
<td>75 MIN</td>
<td>08:40 a.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>09:05 a.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>10:10 a.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>11:15 a.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>12:20 p.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>01:25 p.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>02:30 p.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>03:35 p.m.</td>
</tr>
</tbody>
</table>

Tuesday/Thursday

<table>
<thead>
<tr>
<th>Start Times</th>
<th>End Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 MIN</td>
<td>08:00 a.m.</td>
</tr>
<tr>
<td>75 MIN</td>
<td>08:40 a.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>09:05 a.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>10:10 a.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>11:15 a.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>12:20 p.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>01:25 p.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>02:30 p.m.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>03:35 p.m.</td>
</tr>
</tbody>
</table>

Laboratories and similar exercises

1 HR 55 MIN 08:00 a.m. to 09:55 a.m.
10:10 a.m. to 12:05 p.m.
12:20 p.m. to 02:15 p.m.
02:30 p.m. to 04:25 p.m.

(Mon. and Wed.) 07:30 p.m. to 09:25 p.m.
2 HR 25 MIN 07:30 a.m. to 09:55 a.m.
10:10 a.m. to 12:35 p.m.
02:00 p.m. to 04:25 p.m.

(Mon. and Wed.) 07:30 p.m. to 09:55 p.m.
3 HR 08:00 a.m. to 11:00 a.m.
10:10 a.m. to 01:10 p.m.
01:25 p.m. to 04:25 p.m.

(Mon. and Wed.) 07:30 p.m. to 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
- A = 4.0
- A- = 3.7
- B+ = 3.3
- B = 3.0
- B- = 2.7
- C+ = 2.3
- C = 2.0
- C- = 1.7
- D+ = 1.3
- D = 1.0
- F = 0.0

This is how a semester average is computed:

<table>
<thead>
<tr>
<th>Course</th>
<th>Grade</th>
<th>Credits</th>
<th>Quality Points</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 103</td>
<td>B+</td>
<td>3.3</td>
<td>3</td>
<td>9.9</td>
</tr>
<tr>
<td>ENGL 151</td>
<td>C-</td>
<td>1.7</td>
<td>3</td>
<td>5.1</td>
</tr>
<tr>
<td>DEA 145</td>
<td>B-</td>
<td>3.0</td>
<td>4</td>
<td>12.0</td>
</tr>
<tr>
<td>PAM 100</td>
<td>B</td>
<td>3.0</td>
<td>3</td>
<td>9.0</td>
</tr>
<tr>
<td>DEA 111</td>
<td>C</td>
<td>2.0</td>
<td>3</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>16</td>
<td>42.0</td>
<td></td>
</tr>
</tbody>
</table>

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. (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 may not exercise the S-U option. (4) Only one optional S-U course is allowed per semester.

Architecture, Art, and Planning. (1) All courses specifically required for a degree must be taken for letter grades. (2) S-U grading for courses so designated in the course catalog after approval by the Educational Policy Committee. (3) Freshmen may not exercise the S-U option. (4) Only one optional S-U course is allowed per semester.

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 independent 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
students may be offered on an S-U basis at the letter grade. (2) Elective courses for veterinary medicine.

(1) There is one specifically approved by an admissions officer only when it is the only option or (2) when internal transfer.

Determining a student's academic status. (5) academic standing. (4) A U grade is D–) credits. (3) Student must also be in good standing 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 IRR 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.

Veterinary Medicine. (1) There is one foundation course in the veterinary curriculum that is offered on an S-U basis only. All other required core 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.

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 for those entering freshman undergraduates. 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 Basic 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 Basic 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 Advanced First Aid (Emergency Response) or Wellness and Fitness for the original swimming requirement.

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 as a competitor or manager, 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 freshmen 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 Basic 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 Basic 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 Advanced First Aid (Emergency Response) 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 apply to the Internal Transfer Division (ITD).

To apply, candidates must interview with the division's director and submit an essay to the ITD office outlining their reasons for wanting
to transfer. Internal Transfer Division applicants must also fulfill the application requirements (e.g., interviews, essays) of their target college as if they were applying for direct transfer. 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. Sponsorship is the most important factor determining acceptance into ITD. Students can apply simultaneously for direct transfer and to ITD, so that if direct transfer is denied they might be offered the option of being sponsored in the Internal Transfer Division.

For more information about transfer requirements, students should contact the admissions office of the college they hope to enter and the office of the Internal Transfer Division, 220 Day Hall (255-5486).

Interdisciplinary Centers, Programs, and Studies

ANDREW D. WHITE PROFESSORS-AT-LARGE

726 University Avenue (255-0852)
www.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 while in residence.

Term Ending in 2009

Behrends, Olko, legal historian
Butler, Judith, cultural theorist
Venter, Craig, geneticist

Term Ending in 2010

Aldous, David, statistician
Leeson, Lynn Hershman, digital artist
Peskin, Charles, mathematician
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 Cixous, 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

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 (255–4355)

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 Electrical Engineering or 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 4230 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 6250–6530 Differentiable Manifolds I and II
MATH 6620 Riemannian Geometry
MATH 7110–7120 Seminar in Analysis
MATH 7130 Functional Analysis
MATH 7150 Fourier Analysis
MATH 7220 Topics in Complex Analysis
MATH 7280 Seminar in Partial Differential Equations

Logic and Theory of Computing

CS 6760 Introduction to Automated Reasoning
CS 6766 Reasoning about Uncertainty
CS 6810 Theory of Computing
CS 7192 Seminar in Programming Reflection
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 4200)
CS 6210 Matrix Computations
CS 6220 Numerical Optimization and Nonlinear Algebraic Equations
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 6355 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
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. It supports four U.S. Department of Education Title VI National Resource Centers and 16 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 700 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 studies, French studies, East 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 faculty members and students that brings together Cornell and support faculty to mobilize undergraduate 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
Nicholas van de Walle, center 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/ccms

Comparative Societal Analysis Program
Valerie Bunce, program director
www.soc.cornell.edu/research/comparative.shtm

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.soc.cornell.edu/research/comparative.shtm

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

Gender and Global Change Program
Josephine Allen and Rosemary Batt, program co-directors
www.einaudi.cornell.edu/ggc

International Business Education Program
www.johnson.cornell.edu/research/international

Global Health Program
Rebecca Stoltzfus and Warren Johnson, program co-directors
www.human.cornell.edu/dns/globalhealth

Institute for African Development
Muna Ndulo, program director
www.einaudi.cornell.edu/af
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
cogsci@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 in the College of Arts and Sciences and/or contact Julie Simmons-Lynch, program coordinator (255-6431 or cogsci@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 neuroscience 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) and/or contact Julie Simmons-Lynch, program coordinator, 278G Uris Hall, Office of Cognitive Science (255-6431 or cogsci@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. Recent events have made us aware that 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 study abroad programs are 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; those locations preceded by an asterisk (*) are programs run directly by or affiliated with Cornell.

**AFRICA**

Botswana, Cameroon, Ghana, Kenya, Madagascar, Mali, Tanzania, Uganda: School for International Training (SIT)

Ghana: University of Ghana (through CIEE); NYU
Kenya: Wildlife Management (School for Field Studies); University of Nairobi
South Africa: Universities of Cape Town and KwaZulu–Natal, Organization for Tropical Studies, School for International Training (SIT)
**GENERAL INFORMATION - 2008–2009**

### ASIA
- China: Chinese University of Hong Kong; *Cornell FALCON for the spring semester at Peking University; full year at the 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 Beijing; CET in Beijing or Harbin; Hong Kong University of Science and Technology; Alliance for Global Education in Beijing or Shanghai; Syracuse University program at Tsinghua University, *CAPS at Peking University*
- India: School for International Training; St. Stephen's College Delhi (through Brown or Rutgers Universities); CIEE at University of Hyderabad
- Indonesia: School for International Training, Bali
- Japan: *Kyoto Consortium for Japanese Studies; International Christian University and other university programs; IES Tokyo; CIEE Tokyo at Sophia 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 International Training, Sydney
- 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)*
- 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 Art, Architecture, and Planning Program in Rome; Arcadia University in Florence at the Accademia Italiana; Boston University Program in Padova; IES Milan and Rome; Intercollegiate Center for Classical Studies in Rome; Syracuse University program 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 Study 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; Catholic 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 and Chile: 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) Undergraduate Semester Abroad in tropical biology; School for Field Studies; CIEE
- Cuba: study abroad programs in Cuba are currently suspended
- Ecuador and Jamaica: International Partnership for Service Learning
- 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; IFA-Butler program at Universidad Autónoma de Yucatán, Mérida

### 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, Oman: School for International Training

### 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. About 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 are usually 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 externally 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 program offerings and links to universities and programs worldwide, as well as for applications to download 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. Applications 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 2009 semester and the 2009–2010 academic year is February 15, 2009, for all programs except Oxford and Cambridge, for which the deadline to study at those universities for the full year in 2009–2010 is November 1, 2008. 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 fall. 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 programs approved courses of study completed with satisfactory grades. Students enroll for a full load of courses abroad, according to the standards of the institution or program overseas, and normally 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 transcript will indicate the names of the courses taken, the grades received, and the total credits earned for each semester. The 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 students who participate in programs in a non-English-speaking country with English-language course work are required to take at least one language course as part of their program of study and are strongly encouraged to take more. Students are advised to 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 tenancy, prearrival 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 2008–2009 the Cornell Abroad tuition for students participating in the Berlin Consortium for German Studies, the Cornell Nepal Study Program, EDCUCO (Emory, Duke, and Cornell in Paris), or the Michigan–Cornell–Penn Program in Seville is $21,100. For the Denmark Institute for Study Abroad (DIS), the Cornell Abroad tuition is $21,950 per semester, and for the Kyoto Consortium for Japanese Studies (KCJS), the tuition is $27,500 per semester. For the Bologna Consortium for Study in Philosophy, Politics, and Society (BCSP), the tuition is $16,200 per semester for academic-year students and $18,850 for spring-only participants. Students studying in all other programs in 2008–2009 pay the tuition and other costs charged by their programs and a Cornell International Program Tuition (CITP) of $4,850 per semester. The CITP 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 $5,250. 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 rapidly changing political situations 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 a premature departure. In the event of a disrupted semester, refunds of tuition and fees, and the appropriate 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: Jayne LeGro, B-1 West Sibley Hall; Arts and Sciences: Dean Pat Wasylycia-Levy, 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 INSTITUTE FOR PUBLIC AFFAIRS
294 Caldwell Hall
255-5240 (fax)
cipa@cornell.edu

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 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 courses 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.

Internships and/or Off-Campus Study Options
CIPA fellows are expected to gain practical work experience in an area related to their concentration. The objective is to gain pragmatic professional experience that will complement a student's formal academic study. 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, 95 percent of fellows actively searching for an internship find one. Organizations include:

- Congressional Research Service
- Deloitte and Touche
- Government Accountability Office
- New York City Office of Management and Budget
- Overseas Private Investment Corporation
- United Nations
- U.S. Agency for International Development
- U.S. Department of State
- U.S. Congress
- 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 the fall of 2008, two additional opportunities for study abroad will become available in Mexico City, Mexico, and Budapest, Hungary.

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.

Professional Student 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. Fellows participate in one or more of the following activities for at least two semesters. These initiatives include:

- Colloquium and Conference 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 rigor 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.
- CIPA 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.

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 in 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 public policy or implementation are strongly encouraged to apply. Admission to CIPA is selective.

Decisions are based on:
- potential for public-policy leadership as evidenced by professional work; community, extracurricular, or other relevant experience
- an evaluation of the applicant’s overall academic record
- GRE scores
- two letters of recommendation
- current résumé
- 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 an application or for more information, contact the Cornell Institute for Public Affairs, 294 C.U. Hall, Ithaca, NY 14853; 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. H. 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 three for-credit courses: HORT 4800 Plantations Fall Lecture Series, HORT 4850 Public Garden Management, and HORT 6400 New Directions in Public Horticulture. HORT 4800 is a 1-credit S-U lecture series offered each fall. HORT

INTERDISCIPLINARY CENTERS, PROGRAMS, AND STUDIES 23
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 concentration in Law and Society (see separate listing under "Special Programs and Interdisciplinary Studies"). For information regarding content or availability of EPL core/related courses, contact the academic department listed.

EPL Core Courses

PHIL 1940/GOVT 2947 Global Thinking
PHIL 2420 Social and Political Philosophy
PHIL 2460/BSOC 2061/STS 2061 Ethics and the Environment
PHIL 2470 Ethics and Public Life
PHIL 3420 Law, Society, and Morality
GOVT 6917 Normative Elements of International Relations

Related Courses

ANSC 4140 Ethics and Animal Science
ENGRG 5600/STS 5601 Ethical and Social Issues in Engineering
ILRCB 4820 Ethics at Work
ILRCB 4880 Liberty and Justice for All
NAV 4402 Leadership and Ethics
NBA 6710 Business Ethics
NTRRES 3320 Introduction to Ethics and Environment
NTRRES 4330 Applied Environmental Philosophy
PAM 5670 Health Policy
PHIL 1450 Contemporary Moral Issues
PHIL 2410 Ethics
PHIL 2450 Ethics and Health Care
PHIL 3410 Ethical Theory
PHIL 3460/GOVT 3625 Modern Political Philosophy
PHIL 6410 Ethics and Value Theory
Michele M. Moody-Adams, Wyn and William Y. Hutchinson Professor of Ethics and Public Life; and professor of philosophy; Burke Hendrix, assistant professor of government and assistant professor of ethics and public life; Erin Taylor, assistant professor of philosophy/ethics; Neelam Sethi, senior lecturer in philosophy/ethics.

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
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, geology/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. BIOG 1101/1103 and 1102/1104 (or 1105–1106) or BIOG 1109 and 1110

2. Required introductory course: EAS 2200 The Earth System


   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 by seeking 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 5 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 II;
   - 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 in concert with the students. 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 17 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 Csine, Department of Earth and Atmospheric Science, john.csine@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 talk with their academic advisors to explore 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 general undergraduate business degree. Accredited by AACSB International—The Association to Advance Collegiate Schools of Business, AEM’s undergraduate business program offers a broad, flexible curriculum that reflects the program’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 prepare 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 is the world’s leading hospitality management program. The school offers a rigorous core business curriculum with courses in finance, accounting, real estate, facilities management, planning and design, food and beverage management, marketing, tourism, and strategy; information systems; human resource management and organizational behavior; human resource management, managerial communication, and law. The school’s 150-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 facilities planning and management study interior design, management, environmental psychology, and real estate to pursue careers as facility planners and workplace consultants in real estate firms and large corporations. The policy analysis and management major offers concentrations focusing on health care, consumers, and family and social welfare, and its graduates pursue careers as nonprofit managers, consumer advocates, and policy researchers (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 management, collective bargaining, labor law, labor economics, labor unions, industrial international and comparative labor, and social statistics. Students can then develop special interests in management, dispute resolution, negotiation, employee relations, labor unions, collective bargaining, public relations, and public policy. ILR graduates begin careers in management, consulting, and public policy, but about one-third go directly to law school (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 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 Latin American Studies, Modern European 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 interdisciplinary program in international agriculture and rural development.

**COMBINED DEGREE PROGRAMS**
Highly qualified undergraduates may co-register with the Johnson Graduate School of Management during their senior year, thereby earning their M.B.A. degree in less than the usual time. Students in all Cornell undergraduate colleges may explore this option. The College of Engineering allows qualified students to earn a B.S., M.B.A., and M.Eng. degree in six years. Admission to these combined degree programs is limited to particularly promising applicants. Careful planning is required for successful integration of the course work.

**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 philosophy on human nature and mental behavior. 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 arrange 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.
Business and PreProfessional Study

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.
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, co–senior associate dean
Jan P. Nyrop, co–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
Daniel J. Decker, director of CALS land grant affairs, senior advisor to the dean
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. Aaneskowsky, 104 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, 232 Emerson Hall
Development sociology: Max Pfeffer, 133A Warren Hall
Earth and atmospheric sciences: Teresa E. Jordan, 2116 Snee Hall; Arthur T. DeGaetano, associate chair, 1119 Bradfield Hall
Ecology and evolutionary biology: Richard G. Harrison, E345 Corson Hall
Education: Arthur L. Wilson, 435 Kennedy Hall
Entomology: Jeffrey G. Scott, 2130 Comstock Hall
Food science: Kathryn J. Boor, 114 Stokking Hall
Horticulture: Marvin P. Pritts, 134A Plant Science Bldg.
Landscape architecture: Peter J. Trowbridge, 440 Kennedy Hall
Microbiology: William C. Ghiorse, B76C Wing Hall
Molecular biology and genetics: Kenneth J. Kemphues, 435 Biotechnology Bldg.
Natural resources: Marianne E. Krasny, 118 Kemphues Hall
Neurobiology and behavior: Kraig Adler, 446A S. G. Mudd Hall
Plant biology: William L. Crepet, 412 Mann Library
Plant breeding and genetics: Mark E. Sorrels, 214 Emerson Hall
Statistical sciences: Martin T. Wells, 301 Malott 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, and Pamela Torelli.

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) and Prehealth Collegiate Science and Technology Entry Program (CSTEP). EOP and CSTEP are state-supported programs intended to assist New York State, the nation, and the world.

The Office of Undergraduate Academic Affairs is charged with monitoring and programming for the Educational Opportunity Program (EOP) and Prehealth Collegiate Science and Technology Entry Program (CSTEP). EOP and CSTEP are state-supported programs intended to assist New York State, the nation, and the world.
tate 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 contacts 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 Psychological Services.

The CALS Registrar’s Office holds walk-in hours to assist students with any registrar-related issue. The 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 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 include Melanie Holland, Torrey Jacobs, Shawayn 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 career information books, extensive internship files, employer directories, and job listings. Alumni Career Link is a database of more than 400 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 videotape. 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, Sheri Mahaney, Sharon Rackliffe, or Jo-Lynn Buchanan 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 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, Lorie Fessenden, and Erica Walters.

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 our college. Our 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 live in 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 their 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 letter of interest.

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 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, student teaching, IPM internship, and clinical microbiology internship.

Facilities
The College of Agriculture and Life Sciences is located on the upper campus, up the hill from the central area of Cornell University, 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 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 Warren Hall, Riley-Robb Hall, and 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 and the 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 offer in recognizing 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 Bradford Hall, ad79@cornell.edu

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

Animal science: W. Bruce Currie, 454 Morrison Hall, wbc1@cornell.edu

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

Atmospheric science: Mark Wysocki, 1114 Bradford Hall, mw13@cornell.edu

Biological engineering: Michael Walter, Riley-Robb Hall, mw12@cornell.edu

Biological sciences: Jeffrey Doyle, 404 Mann Library, jbd5@cornell.edu; Bonnie Cornella, 216 Stimson Hall, bcc3@cornell.edu

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

Biometry and statistics: Steven Schwager, 1194 Comstock Hall, ssj5@cornell.edu

Communication: Brian Earle, 328 Kennedy Hall, boe1@cornell.edu

Crop and soil sciences: Antonio DiTommaso, 903 Bradford Hall, ad79@cornell.edu

Development sociology: Tom Hirschel, 333 Warren Hall, th2@cornell.edu

Entomology: John Losey, 4126 Comstock Hall, jrl127@cornell.edu

Environmental engineering: Michael Walter, Riley-Robb Hall, mw12@cornell.edu

Food science: Alicia Orta-Ramirez, 107 Stocking Hall, aor98@cornell.edu

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

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

International agriculture and rural development: Terry Tucker, 16 Warren Hall, ttt2@cornell.edu

Landscape architecture: Peter Trowbridge, 440 Kennedy Hall, pjt@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/protect): Peter Davies, 255 Plant Sciences Bldg., pjd2@cornell.edu

Science of earth systems: John Cisne, 2102 Snee Hall, jhc1@cornell.edu

Science of natural and environmental systems: Tim Fahey, 12 Fernow Hall, tf5@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/doublmaj.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 (B.SLA) 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 Agriculture, 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: TBA, 146 Warren Hall, lgm2@cornell.edu

Animal breeding: John Pollak, B-47 Morrison Hall, ep6@cornell.edu

Animal science: Richard Quaaas, B-47 Morrison Hall, rq2@cornell.edu

Atmospheric sciences: Kelly Cook, 5114 Snee Hall, khc5@cornell.edu

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

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

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

Communication: Bruce Lewenstein, 321 Kennedy Hall, bwl1@cornell.edu

Development sociology: Lindy Williams, 336 Warren Hall, lw20@cornell.edu

Ecology and evolutionary biology: Irby J. Lovette, 188 Johnson Center, Lab of Ornithology, ilj2@cornell.edu

Education [also M.A.T.]: John Sipple, 421 Kennedy Hall, jps2@cornell.edu

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

Environmental toxicology: Andrew Yen, Stocking Hall, ay15@cornell.edu

Food science and technology: Martin Wiedmann, 412 Stocking Hall, mw16@cornell.edu
**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. Upperclassmen 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/](http://www.cals.cornell.edu/cals/current/career/)
- **CALS Undergraduate Research Opportunities**: [www.cals.cornell.edu/cals/current/student-research/undergrad/](http://www.cals.cornell.edu/cals/current/student-research/undergrad/)
- **CALS Research Honors Program**: [www.cals.cornell.edu/cals/current/student-research/honors/](http://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/](http://www.cals.cornell.edu/cals/current/student-research/grants/)
- **CALS Undergraduate Minority Research**: [www.cals.cornell.edu/cals/current/student-research/minority/](http://www.cals.cornell.edu/cals/current/student-research/minority/)
- **CALS Internship Guidelines**: [www.cals.cornell.edu/cals/current/student-research/internship/](http://www.cals.cornell.edu/cals/current/student-research/internship/)

**Undergraduate Research @ Cornell**: [www.research.cornell.edu/curb/](http://www.research.cornell.edu/curb/)

**CALS Undergraduate Research Board**: [www.cals.cornell.edu/cals/current/student-research/undergrad/](http://www.cals.cornell.edu/cals/current/student-research/undergrad/)

**CALS Undergraduate Research Tower**: [www.cals.cornell.edu/cals/current/student-research/minority/](http://www.cals.cornell.edu/cals/current/student-research/minority/)

**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 are required to send an electronic version of their thesis title, abstract, and the research advisor’s name to Ann Gartner, amg286@cornell.edu, by the end of the spring semester. In addition to copies of the entire thesis requested by the program area, one copy is required by the Office of Academic Programs (140 Roberts Hall). This copy will be made available in Mann Library. 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 as a compilation of honors theses abstracts.

The bachelor of science degree with “distinction in research” is conferred upon students with a special opportunity to work with a faculty mentor and to experience the research process. Successful completion requires a thesis written in the style of a master’s thesis or scholarly journal article. Unless otherwise noted 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 (CURBS) 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 encouraged 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 4990 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.
- 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 & 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 8 credits each in BSOC, ALS, or HE 4991–4992, Honors Project I and II. More information on the 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.

**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 specializing 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 4970 Independent Study during any semester while working toward a research honors thesis. 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.

Applications will be reviewed by a committee consisting of the biology & society program, 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 8 credits each in BSOC, ALS, or HE 4991–4992, Honors Project I and II. More information on the program is available in the Biology & Society office, 306 Rockefeller Hall (255-6047).

**Sequence of Requirements**

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 plan 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 8 credits each in BSOC, ALS, or HE 4991–4992, Honors Project I and II. More information on the 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.
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 4990).

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. These copies are in addition to the unbound copy required for Mann Library. A 250-word abstract must be provided electronically to the CALS Office of Academic Programs and must appear at the front of the thesis (see “CALS Requirements for Honors Thesis”).

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, find and carry out 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 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.”

Nutritional Sciences
Faculty committee: J. T. Brenna, C. Bisogni
The research honors program in the Division of Nutritional Sciences is a structured experience that requires (1) taking a course in research (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 carry full academic loads. 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 410.

Students interested in the program should take NS 4980 as early in their program as possible. Students are required to write the honors project proposals in fulfillment of the research honors program requirements at the DNS Honors Research Program web site (www.nutrition.cornell.edu/dns7_undergradhonres.html) or contact Professor Brennan. 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 directors 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/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 assigns 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 program 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 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.

**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.

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.

**Social Sciences**

Faculty committee: Nancy Chau, chair; Angela Gonzales, Travis Park, and Cliff Scherer

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. The evaluation of the student’s written application, and on approval of a detailed thesis proposal. The application and proposal are due to the program area chair no later than the third week of the first semester of the senior year. Each student is encouraged to begin working on this proposal with a prospective faculty thesis advisor during the 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:

- 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 estimates 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 research 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 returned by the honors committee within 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 certifying that 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.

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

Faculty advisors must be members of the graduate faculty. Exceptions may be granted for persons with special expertise pending petition to the Social Science Research Honors Committee. Students should register for honors credit directed by the faculty research honors project advisor.

Distinction in research is awarded upon approval of the research honors thesis by the Social Sciences Research Honors 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.

Honors theses should be written according to the form of any standard journal within the appropriate field. The Honors Committee recommends the submission of the thesis draft to the thesis advisor two months before graduation to permit sufficient time for revision. Two copies of the thesis must be submitted to the chair of the Honors Committee no later than the middle of the second-to-last month before graduation (i.e., April or November). A supporting letter from the faculty member supervising the work also must be submitted. The thesis will be independently reviewed and further revisions may be required before the thesis is accepted. Final approval of the thesis requires a majority vote of the Honors Committee.

### OFF-CAMPUS OPPORTUNITIES

**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 for 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 4000. 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 independent 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 cwl.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, Massachusetts. 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 focus 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, fresh water 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 (Dr. Thomas Prach, E309 Corson Hall, 255-6757) or from the director of the program (Dr. Ken Foreman, MBL Ecosystems Center, 508-289-7777; courses.mbl.edu/SES).

**SEA Semester**

The SEA Semester 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. Six weeks are spent in Woods Hole, and the following six weeks are spent on either one of SEA’s two sailing vessels: the SSV Robert Seamans or the SSV Corwith Cramer. 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 (B IOSM), 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. Unlike 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’s attention 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 497-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 on the web at cal.s.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 the Registrar's Office 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 about 200 CALS undergraduates spend an academic year or semester studying abroad. Whether attending a large university in Australia, a smaller campus in Sweden, or a university in Singapore or Hong Kong, CALS students have a variety of international study options available to them. They 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 between Cornell University and Ithaca College 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 not count toward the minimum 12 credits required for full-time status.
- Review or supplemental courses (e.g., 1000- to 1099-level courses) increase the number of credits required for graduation by the number of credits in the course.
- 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 between Cornell University and Ithaca College 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 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.
- Minimum credits at Cornell: 60 academic credits must be completed at Cornell.
- Maximum non-Cornell credits: 60 non-Cornell credits (AP, CASE, transfer, Cornell Abroad, and exchange credits) can be applied toward degree requirements.
- 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, BIOM, BIONB, BION, BIOSM, BTRY, COMM, CSS, DSOC, EAS, EDUC, ENTOM, FDSC, HORT, IARD, INFO, LA, NS, NTRES, PLLR, PLPA, SNES.
- Maximum credits from endowded colleges: 55 endowed credits can be completed without incurring excess tuition charges.
- Endowed credits include all courses from departments in the College of Arts and Sciences, Architecture, Art, and Planning, Engineering, the Hotel School, the Johnson School of Graduate Management, and the Law School. Courses completed during the summer and winter sessions do not count against the 55 endowed credit limit.
- Minimum letter-graded credits: 100 (prorated based on non-Cornell credits).*
- 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. Freshmen are limited to one S-U course per semester.
D. PE does not count toward the 12 credit minimum required for full-time status.

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.

3. Schedule Requirements
A. Students are expected to enroll in at least 5 credits each semester.
B. Freshmen may not enroll in more than 18 credits, not including physical education.

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 charged 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.
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, analyzing and criticizing 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 (ARSC—language only), Asian Studies (BENG, BURM, CHIN, HINDI, INDO, JAPAN, KMER, 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, POLISH, SEICB, and UKRAN).

Diversity (D)
Although not a requirement, the college recommends that students take at least one diversity course.

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 2100, 2030, 3600

Written Expression

First-Year Writing Seminars

Sophomore 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 not 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. 8–12 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, the Registrar staff will 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 I40 Roberts Hall.
6. 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:

1. Course cannot be used to fulfill high school graduation requirements.
2. Course must be a standard course taught by a post-secondary institution, available to all students.
3. 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.
4. Course syllabus, text, examinations, and evaluation process must be the same for all students at all sites.
5. Students must be enrolled for college credit and pay college tuition.
6. Instructor must be a faculty member (includes adjunct) at the offering college.
7. 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.
8. Written verification from the offering institution must be provided to confirm that all credit earned in high school meets these criteria. It is the student’s responsibility to request this written verification. 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 coursework that does not meet the criteria outlined above.

Graduation Procedures
1. The progress of each student toward meeting the degree requirements is recorded each semester in the CALS Registrar’s Office on a graduation summary form. Students can review their graduation summary online at https://dust.cals.cornell.edu.
2. 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.
3. 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: September 15
May graduates: December 1

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 pick-up 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 the 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 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 by logging into Cornell University’s student information system. Students must register for courses before the end of the seventh week.

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 “Just the Facts” or the official course drop and add form at the 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.

To enroll in courses that involve independent study, teaching, 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.

Consultation with their faculty advisor, students pre-enroll by computer.

https://dust.cals.cornell.edu
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:
   • in any other manner violate the principle of absolute integrity.
   • make clear the conditions under which the code is to be violated Cornell standards for academic integrity are to be confronted and, if found to be in violation of those standards, sanctioned.
   • 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.
   • make clear the consequences of violating any aspects of the code.

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.

5. 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."
   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."
   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.
   Founded in 1929, is the undergraduate honor society of the College of Agriculture and Life Sciences. Members are selected 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 website at www.hndk.org/.
   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 website at www.rso.cornell.edu/gkihs/.

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

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 the 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 ease 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 advisors. 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 industries. 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. Satisfaction 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, debvins@cornell.edu.
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 general undergraduate business degree. Accredited by AACSB International—the Association to Advance Collegiate Schools of Business—AEM's undergraduate business program offers a broad, flexible curriculum. Ten (10) 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
Strategy

Minors
Through the Department of Applied Economics and Management, CALS students may complete a minor program of study in eight different subject areas: Agribusiness Management, Business, Environmental and Resource Economics, Finance, Marketing, Food Industry Management, Applied Economics, International Trade and Finance. The minors consist of between 18 and 20 credits of required courses. 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 business 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 three 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 2000 or equivalent

3. **Basic physical sciences:**
   a. PHYS 2207, 2208, or equivalent
   b. CHEM 1560

4. **Tracks**

<table>
<thead>
<tr>
<th>Operational required</th>
<th>Education required</th>
<th>Broadcasting required</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 2500</td>
<td>EAS 1310</td>
<td>EAS 1310</td>
</tr>
<tr>
<td>EAS 2960</td>
<td>EAS 1330</td>
<td>EAS 1330</td>
</tr>
<tr>
<td>EAS 4560</td>
<td>EAS 2500</td>
<td>EAS 2500</td>
</tr>
<tr>
<td>EAS 4700</td>
<td>EAS 2960</td>
<td>EAS 4700</td>
</tr>
<tr>
<td></td>
<td>COMM 2010</td>
<td></td>
</tr>
</tbody>
</table>

**suggested**

<table>
<thead>
<tr>
<th>Business required</th>
<th>Environmental required</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 1310</td>
<td>CHEM 2070</td>
</tr>
<tr>
<td>EAS 1330</td>
<td>CHEM 2080</td>
</tr>
<tr>
<td>EAS 2680</td>
<td>EAS 3340</td>
</tr>
<tr>
<td></td>
<td>EAS 4570</td>
</tr>
</tbody>
</table>

**suggested**

**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 systematic 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**
   - 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
   - b. Five courses (15 credits) in technology. Three courses from the list of approved technology courses**
     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
   - **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 can elect courses that satisfy the requirements and courses, see "Biology & Society" under the College of Arts and Sciences requirements, at 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, or a 5 in AP biology)
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 ssj5@cornell.edu or go to www.bscb.cornell.edu.

Requirements for the Major (beyond the college requirements)

Ten (10) 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
- BTRY 4820 Statistical Genomics
- BTRY 4830 Quantitative Genomics and Genetics
- BTRY 4940 Computational Genomics
- BTRY 4790/CS 4782 Probabilistic Graphical Models

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 2240 Linear Algebra and Multivariable Calculus

One (1) 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 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
- COMM 1101 Cases in Communication
- 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 Psychology of Social Computing
- COMM 2820 Research Methods in Communication Studies
- COMM 2200 Media Communication
- COMM 2450 Psychology of Social Computing
COMM 2760  Cases in Communication and Social Influence

COMM 2850  Communication in the Life Sciences

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 in the life sciences (CILS): Students focusing in CILS will investigate how communication influences public understanding of science, environmental, and risk-related issues. While exploring conceptual and theoretical issues, students will learn specific skills for communicating science, environmental, and risk information to a variety of audiences. Possible career paths include public information officer, science writer, environmental educator/outrach 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. These processes extend 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, 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 individuals 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 in the individual and societal level. Possible career paths include public relations, marketing communications, polling, human resources, governmental affairs, sales, 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-computer interaction 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 sciences (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 4410) and plant protection (CSS 3150, 4440, ENTR 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 Exam, 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 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 and select a sequence of courses: introductory sociology (DSOC 1101), international development (DSOC 2050), population dynamics (DSOC 2010), methods (DSOC 3130 or 3140), theory (DSOC 3010), social stratification (DSOC 2700), 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 limiting 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 post-graduate study. Accordingly, students are expected to become involved in the application of theory, methodology, and principles and concepts in many areas of study.

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, sociocultural 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 135 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 both 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 are involved in 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 diverse contexts and across the lifespan. The department has two foci to meet societal demands for teachers, researcher, and learners. The Learning, Teaching, and Social Policy (LTSP) concentrates on 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, non-formal, and formal organizations and focuses on community 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 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, the 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, 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, critical 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.

The Cornell Teacher Education (CTE) program is a unique interdisciplinary cohort-based program that certifies teachers for secondary teaching in agricultural science, education; staff development; and health issues related to the education of adults.
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 non-school 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 408 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, but must include one course in calculus
- One semester of physics (may need two depending on future plans)
- CHEM 1560–2080 or 2070–2080
- CHEM 1570 (organic)
- Introductory biology (101–104 recommended, even if AP credit received)
- BIOGD 2810 (genetics) or PLBR 2250 (plant genetics)
- BIOE 2780 (Evolutionary Biology)
- Choose one of the following two courses:
  - BIOE 2610 (Ecology and the Environment)
  - BIOBM 3500 or 3510 (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 3510/3511 Insect Systematics—4 cr
  - ENTOM 3330 Larval Insect Biology—3 cr
  - ENTOM 3250 Medical and Veterinary Entomology—4 cr
  - ENTOM 4440 Integrated Pest Management—4 cr

**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 four specialization options in the major: (1) food science; (2) food operations and management; (3) food biotechnology; or (4) environmental science. The major 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 to move to the major. The second year emphasizes the application of these basic sciences and technology to the manufacturing, sensory evaluation, storage, distribution, and safety of foods and food ingredients. Examples of second-year 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.
Enology and Viticulture. Students with primary interest in viticulture and secondary interest in enology (V/E) can enroll in the plant sciences degree program, with a concentration in horticulture and a specialization in Viticulture. For these students, plant science courses will be their “major,” and their required courses in enology (offered within the Food Science program) could contribute to a “minor” in Food Science.

Students with primary interest in enology and secondary interest in viticulture (E/V) may major in Food Science (with a concentration in enology) and meet the minor requirements in plant sciences if so desired (with a concentration in horticulture).

Students in either track will take many of the same courses during their two years and must satisfy the core degree-program requirements of their major and minor program, as well as the general requirements of the college. The curriculum will consist of course work in the basic sciences (e.g., chemistry, biology, microbiology) as well as advanced courses in plant and food sciences. In addition, students will be expected to participate in internships at vineyards and/or with wine makers.

The curriculum is designed to provide students with a strong background in the basic sciences, coupled with a thorough understanding of plant and food sciences as applied to viticulture and wine making. Elective courses can be taken in a variety of areas to support and expand the major.

Prospective students should contact the undergraduate coordinators in either the Department of Horticulture (viticulture option) or Food Science (enology option) for specific course requirements.

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 12 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.

**Requirements**

Core (12 courses)

1. **Introductory (two courses):**
   - INFO 1301 Introduction to Programming Web Applications
   - INFO 1302 Introduction to Designing Web Applications

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 3010 Introduction to Statistics and Probability; PSYCH 3500 Statistics and Research Design

3. **Human-Centered Systems (two courses):**
   - INFO 2140 Cognitive Psychology
   - INFO 2450 Psychology of Social Computing

4. **Information Systems (two courses):**
   - CS 2110 Object-Oriented Programming and Data Structures
   - INFO 2500 Intermediate Design and Programming for the Web

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.

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**
   - 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 in Collaboration
   - PSYCH 3800 Social Cognition*
   - PSYCH 4130 Information Processing: Conscious and Unconscious
   - 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
   - INFO 3720 Explorations in Artificial Intelligence
   - CS 4450 Computer Networks
   - LING 4424 Computational Linguistics
   - INFO 4500 Information Retrieval
   - INFO 4502 Web Information Systems
   - CS 4620 Introduction to Database Systems
   - 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
   - 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
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 a Digital Age
INFO 4550 Seminar on Applications of Information Science
ORIE 4550 Introduction to Game Theory*
INFO 4444 Responsive Environments
INFO 4570 Social and Economic Data
HADM 5574 Strategic Information Systems*
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 4550 and ECON 3680 may be taken for IS credit. Only one of AEM 3220 and HADM 5574 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. 436). 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.)

<table>
<thead>
<tr>
<th>First Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester</td>
<td></td>
</tr>
<tr>
<td>*LA 1410 Grounding in Landscape Architecture</td>
<td>4</td>
</tr>
<tr>
<td>Biological sciences elective</td>
<td>3</td>
</tr>
<tr>
<td>Physical sciences elective</td>
<td>3</td>
</tr>
<tr>
<td>Social sciences or humanities elective</td>
<td>3</td>
</tr>
<tr>
<td>Written or oral expression elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>
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

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

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

Third Year
Fall Semester
*LA 3010 Integrating Theory and Practice 5
*LA 3150 Site Engineering 5
†Free electives 4

Spring Semester
**Concentration 6
*LA 3810 Site Construction 5
Electives 2

Fourth Year
Fall Semester
*LA 4010 Advanced Synthesis: Project Design 5
**Concentration 3
†Social sciences or humanities elective 3
(Optiona landscape architecture study abroad semester in Denmark or Rome) 11

Spring Semester
*LA 4020 Integrating Theory and Practice II 5
**Concentration 3
*LA 4120 Professional Practice 1
†Free elective 2

Summary of credit requirements
*Specialization requirements 58
†Distribution electives 39
†Free electives 8
**Concentration 15

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  Credits
*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
LA 5900 Theoretical Foundations 2

Spring Semester
*LA 5020 Composition and Theory 5
*LA 4920 Creating the Urban Eden: Woody Plant Selection, Design and Landscape Establishment 4
**Concentration 2
*Historical studies 3

Second Year
Fall Semester  Credits
*LA 6010 Integrating Theory and Practice 5
*LA 6160 Site Engineering 5
**Concentration 6

Spring Semester
*LA 6020 Integrating Theory and Practice 5
*LA 6180 Site Construction 5
*LA 6900 Methods of Landscape Architectural Inquiry 3
**Concentration 3

Third Year
Fall Semester  Credits
*LA 7010 Urban Design and Planning 5
†Free elective 2
**Concentration 4
*Historical studies 3

Spring Semester
*LA 8000 Master's Thesis in Landscape Architecture 9
or *LA 7020 Advanced Design Studio 5
*LA 4120 Professional Practice 1
†Free electives 2 or 6
Concentration LA 6030 1

Summary of credit requirements
*Specialization requirements 64 or 68
**Concentration 16
†Free electives 6 or 10

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, and two courses in site engineering, a seminar in design theory, a course in professional practice, and 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)
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 with biodiversity 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, sustainable development, and resource management.

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 will shape 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 will select an area to pursue 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 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, 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 in this concentration typically focus their coursework 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 coursework within the departments 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 in 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 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 coursework 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 reconstituting the relationship 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. A course, or a concentration, highlighted environmental theme ensures development of specific competencies linked to personal and professional ambitions of the individual student. Example themes include the 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. 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, 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 understanding and appreciating 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. Advanced study provides 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 that interest them. The core requirements include 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 Nutritional and Physicochemical Aspects of Food; NS 3450 Nutritional and Physicochemical Aspects of Food; NS 3510 Physiological and Biochemical Bases of Nutrition; and NS 3200 Methods in Nutritional Sciences. In addition, students select a minimum of three advanced courses in nutritional sciences as well as elective courses in the 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 their 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 school or employment in research or in a plant science laboratory.

The Division of Nutritional Sciences is affiliated with 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, 21 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. Enrollment is limited in some courses. Please check www.nutrition.cornell.edu/undergrad/calsmin.html for details.

**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 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. Other courses relating to plant science are offered elsewhere in the university. There are also ample opportunities for internships, undergraduate teaching, and research experience. Qualifying 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 work force 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 law firm, 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.

**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 sciences (plant 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.

**Enology and viticulture.** The College of Agriculture and Life Sciences offers a curriculum in viticulture and enology within existing undergraduate B.S. degree programs in plant sciences and food science.

Students with primary interest in viticulture and secondary interest in enology (V/E) can enroll in the plant sciences degree program, with a concentration in horticulture and a specialization in viticulture. For these students, plant sciences will be their "major," and their required courses in enology (offered within the food science program) will constitute a "minor" in plant sciences with a concentration in enology.

Students with primary interest in enology and secondary interest in viticulture (E/V) will "major" in food science (with a concentration in enology) and "minor" in plant sciences (with a concentration in Horticulture).

Students in either track take many of the same courses during their two to four years, and must satisfy the core degree-program requirements of their major and minor programs, as well as the general requirements of the college. The curriculum consists of course work in the basic sciences (e.g., chemistry, biology, microbiology) as well as advanced courses in plant and food sciences. In addition, students are expected to participate in internships at vineyards and/or with wine makers.

The curriculum is designed to provide students with a strong background in the basic sciences, coupled with a thorough understanding of plant and food sciences as applied to viticulture and wine making. Elective courses can be taken in a variety of areas to support and expand the major. Prospective students should contact the undergraduate coordinators in either the...
Department of Horticulture (viticulture option) or Food Science (enology option) for specific course requirements.

**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, nurseries 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 tea. The knowledge and techniques are 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) and 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 man. 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 BIOL 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 instance, 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 to agrichemical 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)**

During the past several decades, with the increasing concern about issues such as air and water pollution, nuclear waste disposal, the destruction of the ozone layer, and global climate change, the scientific community has gained considerable insight into how the biosphere, hydrosphere, atmosphere, and lithosphere systems interact. It has become evident that we cannot understand and solve environmental problems by studying these individual systems in isolation. The interconnectedness of these systems is a fundamental attribute of the Earth system, and understanding their various interactions is crucial for understanding our environment.

The SES major emphasizes the basic 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. Cornell's strengths across a broad range of earth and environmental sciences have been fused to provide students with the tools to engage in what will be the primary challenge of the 21st century. The SES major has its home in the Department of Earth and Atmospheric Sciences, but includes collaboration with other departments across the university.

The SES curriculum includes a strong preparation in mathematics, physics, chemistry, and biology during the freshman and sophomore years. During the junior and senior years, students complete the SES core sequence, studying such topics as climate dynamics, Earth system evolution, biogeochemistry, and Earth's interior. These classes emphasize the interconnectedness of the Earth system. The selection of upper-level concentration courses allows the student to develop an area of expertise that complements the breadth of the introductory and SES core courses. Traditional concentrations include atmospheric sciences, biogeochemistry, geological sciences, and ocean sciences. Students desiring a concentration focused on less traditional areas of study are encouraged to work with their advisors to develop an individually designed concentration. Individually designed concentrations might encompass more interdisciplinary studies in topics such as sustainable Earth and environmental systems or Earth system science and policy.

The SES major provides a strong preparation for graduate school in any one of the Earth system sciences, such as atmospheric sciences, geology, geophysics, geochemistry, oceanography, hydrology, and biogeochemistry. Students seeking employment with the B.S. degree will have many options in a wide variety of environmentally oriented earth resource careers 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.
   - a. MATH 1910–1920 (or MATH 1110–1120)
   - b. PHYS 2207–2208 (or PHYS 1112–2213)
   - c. CHEM 2070–2080 or 2070–1570 or 2090–2080
   - d. BIOG 1101/1103–1102/1104, or 1105–1106, or BIOG 1109/1110

2. **Required Introductory Course:**
   - EAS 2200 The Earth System

3. **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 (5000 level and up) that build on the core courses and have prerequisites in the basic
Agriculture and Life Sciences - 2008–2009

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 earlier 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 1010, 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 1010 Intro to the Science and Management of Environmental and Natural Resources
Social Systems: DSOC 3240 (STS 3241/SOC 3240) Environment and Society

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 interdisciplinary work, independent thinking and analysis, and development of competency in writing and speaking.

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 D);
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).

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

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 300 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, see snes.eas.cornell.edu, visit the undergraduate program office in 12 Fernow Hall, or send e-mail to sw386@cornell.edu.

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 may 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.
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 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. S-U or letter grades. Staff. For description, see CSS 3800.

AGSCI 4010 Seminar in Agricultural Sciences
Fall or spring. 1 credit. S-U grades only. Staff.

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 their 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. 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.

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 300- or 400-level only. No 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. Students seeking to minor in American Indian Studies are encouraged to contact Professor Kurt Jordan, associate director of academic development, 255-3109. 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 1950 Colonial Latin America
AIS 2360 Native Peoples of the Northeast
AIS 2390 Seminar in Iroquois History
AIS 2600 Introduction to Native American Literature
AIS 2660 Introduction to Native American History
AIS 3640 Politics of ‘Nations Within’
AIS 3860 Contemporary American Indian Fiction of the United States
AIS 4040 Race and Ethnicity in Latin America
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 2300 Cultures of Native North America
AIS 2350 Archaeology of North American Indians
AIS 3110 Social Movements
AIS 3400 Contested Terrain: Hawaii
AIS 3480 Iroquois Archaeology
AIS 3530 Anthropology of Colonialism
AIS 4000 Critical Approaches to American Indian Studies
Examines contemporary American Indian land use as a sociopolitical and cultural process to effect social change.

AIS 3330 Ways of Knowing: Indigenous and Local Ecological Knowledge (Fall) (ANTHR 3330) (CA) (SBA) (D)
Fall. 3 credits. Prerequisites: junior, senior, or graduate standing. Letter grades only. K.A. 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 in conjunction with 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/hawaii/ regarding the status of this course.

AIS 3480/6480 Iroquois Archaeology (also ANTHR 3480/6480) (CA) (HA)
Fall. 4 credits. S-U or letter grades.
For description, see ANTHR 3248/6248.

AIS 3640 Politics of “Nations Within” (also GOVT 3640) (SBA) (KCM)
[AIM 3860 Contemporary American Indian Fiction (also ENGL 3670) (LA) (CA) (D)]
Fall. 4 credits. Next offered 2010–2011. Examines contemporary American Indian fiction as a response to the colonial structure of federal Indian law. Beginning with Mourning Dove’s Cogeeva, 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 400 and 600 levels. S-U or letter grades. Next offered 2009–2010. 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 of “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. Next offered 2009–2010. 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)
Spring. 6 credits. Prerequisite: permission of instructor. K. A. Jordan.
This course uses historic-period American Indian sites in the Finger Lakes region to provide hands-on instruction in archaeological field, laboratory, and analytical methods. Students will analyze museum artifacts and engage in field survey and excavation. Readings treat field and laboratory methodology, research design, culture history, and material culture typologies.

AIS 4720/7720 Historical Archaeology of Indigenous Peoples (also ANTHR/ARKEO 4272/7272) (CA) (HA)
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 documentary histories.

AIS 4860 American Indian Women’s Literature (also ENGL 4860) (LA) (CA) (D)
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) (D)
Fall. 4 credits. J. Parmenter.
For description, see HIST 4900.

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 5000 Critical Approaches to American Indian Studies (also AIS 4000) (D)
Fall. 4 credits. Next offered 2009–2010. 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) (D)
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)
For description, see ENGL 6610.

AIS 6710 Law and Literature in the Antebellum United States (also ENGL 6710)
Spring. 4 credits. 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.

Department of 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.

Environmental Toxicology

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 ENTO 3070)
Fall. 2 credits. Prerequisites: BIOG 1101–1102 or equivalent. Offered even-numbered years. A. G. Hay. For description, see ENTO 3070.

TOX 4370 Eukaryotic Cell Proliferation (also BIOM 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 BIOM 3300 or 3310/3320. Recommended: BIOGD 2810 and BIOM 4520. S. Lee. For description see BIOM 4370.

[TOX 4900 Insect Toxicology and Insecticidal Chemistry (also ENTO 4900)]
Spring. 3 credits. Prerequisite: general chemistry course. Offered even-numbered years; next offered 2009–2010. J. G. Scott. For description, see ENTO 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. Steedinger. 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. 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. S. Bloom, R. Dieterl, 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 VTBSM 7010)
Fall. 1 credit. Prerequisites: basic course in histology (BIOAP 4150 or equivalent) highly recommended, or permission of instructor. Letter grades only. A. Nikitin. For description, see VTBSM 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 VTBSM 7130)]
Spring. 1 credit. S-U grades only. Offered even years; next offered 2009–2010. A. Yen. For description, see VTBSM 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

NONDEPARTMENTAL COURSES

ALS 1100 College and Career Exploration in the College of Agriculture and Life Sciences
Summer. 1 or 5 credits. Prerequisite: high school juniors or seniors. Letter grades only. Staff. This program is a great opportunity to explore possible majors, careers, and research opportunities in Cornell's world-class College of Agriculture and Life Sciences (CALS) while earning college credit. The one-week program, for 1 credit, will consist of students attending presentations by admissions, career, and student services offices; talk with faculty members, staff, and students; visit labs and research facilities; enjoy field trips; participate in team projects; and write several short papers. You'll also focus on two of CALS's four priority areas. The three-week program, for 3 credits, combines the one-week program with two additional weeks of in-depth, hands-on exploration into the two subject areas you selected during the first week.

[ALS 1101 Transition to and Success at Cornell]
Fall. 1 credit. Prerequisite: entering students in CALS. Letter grades only. Staff and CALS Career Development Office.

ALS 1340 Emergency Medical Technician
Fall and spring. 3 credits each semester. 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.

ALS 1350 Advanced Emergency Medical Technician, Critical Care
Fall and spring; two-semester course. 4 credits each semester. Prerequisite: current certification as N.Y.S. Basic or Intermediate E.M.T. or have applied for reciprocity. S-U or letter grades.

ALS 1340 Emergency Medical Technician
Fall and spring; two-semester course. 4 credits each semester. Prerequisite: current certification as N.Y.S. Basic or Intermediate E.M.T. or have applied for reciprocity. S-U or letter grades.

ALS 2020 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.

ALS 4770 Environmental Stewardship in the Cornell Community
Spring. 2–4 credits, variable. J. M. Regenstein, plus faculty advisor for credits 3 and 4. Each student undertakes an original project to improve the environment at Cornell while working with a faculty advisor and the Cornell infrastructure (generally campus life and 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 the final written project report orally at a public forum. (Note: If students prefer to take 1 or 2 credits of independent research in a department in the College of Agriculture and Life Sciences, this can be arranged. Assistance in finding a faculty advisor is provided. May be taken more than once.)
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 4991/4992 Honors Project I and II (also BSOC/STS/HE 4991/4992)
Fall among others. 8 credits (register for 8 credits each semester; total credits awarded is 8). Prerequisite: biology & society seniors and permission of department; overall GPA of 3.3. Apply in 506 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.
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 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 and demonstrate critical listening and language fluency with attention to time frame usage, academic terminology, extended discourse, and compensatory speech strategies.

ALS 5811 Environmental Policy (also BSOC 4611-4612, BIOEE 6610–6611)
Fall, 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.

APPLIED ECONOMICS AND MANAGEMENT


AEM 1101 Introduction to Applied Economics and Management
Fall. 1 credit. Prerequisite: required of and limited to freshmen in EAM S-U grades only. D. A. Grossman and A. M. Novakovic.
The purpose of this course is to acquaint first-year students in EAM 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 EAM. In addition, there are guest presenters from venture capital, career planning, student organizations, course planning, and ethics and academic integrity. There are several homework assignments.

AEM 1102 Personal Evaluation and Development
Spring. 1 credit. Required for and open only to all AEM first-year students. A. 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, ethics, and interpersonal relationships. Weekly meeting will either be one plenary lecture or a smaller lab. There will be a service activity coordinated through the Public Service Center scheduled over a weekend. There will be a “robes” activity through the Outdoor Education Center, with times arranged to accommodate the facility.

AEM 1200 Introduction to Business Management (D)
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 technology and its impact on operations, globalization, ethics, economy, and entrepreneurship. Guest speakers are an important part of the course.

AEM 1201 Business Management Case Analysis
Fall. 1 credit. Requirement for and limited to AEM majors. P. D. Perez.
Offers student teams the opportunity for hands-on application of general business management concepts through discussion and written analysis of a series of cases. Case topics are closely coordinated with both the content and sequencing of material presented in AEM 1220.

AEM 1210 Entrepreneurship Speaker Series
Fall. 1 credit. M. P. D. Perez.
Seminars and guest lectures by faculty members engaged in the study and practice of entrepreneurship and by prominent entrepreneurs associated with the Entrepreneurship and Personal Enterprise program at Cornell, with a view to inform and inspire students. Evaluation includes attendance and written feedback on lectures. Intended as a companion to AEM 1200 but may be taken independently.

AEM 1220 Entrepreneurship in the Life Sciences
Spring. 1 credit. W. Lesser.
Seminars and guest lectures by faculty members 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. 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. Includes lectures, selected guest appearances by successful entrepreneurs, and extensive use of IT-based learning and presentation tools.

AEM 2000 Contemporary Controversies in the Global Economy
Fall. 3 credits. Prerequisite: ECON 1110. Recommended: ECON 1120. Priority given to sophomores and juniors in AEM. C. Barrett.
Aims to stimulate critical thinking and cogent writing and speaking about contemporary controversies that attract regular attention in the international press and among key private and public sector decision-makers. Students read and discuss competing arguments about current issues such as patenting and pricing of pharmaceuticals worldwide, controls on commercial and humanitarian distribution of...
genetically modified foods, and immigration restrictions. Students write a series of short briefing papers and give regular oral briefs, which are evaluated for quality of communication and content.

**AEM 2100 Introductory Statistics**
Spring. 4 credits. Prerequisite: EDUC 115 or equivalent level of algebra. Two evening prelims. J. Little. 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, spring, 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**
Fall, spring, summer. One credit. 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 summer AEM Certificate in Management 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 resume/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 gain an understanding of the 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. Dase. 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. 5 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 lecturers 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. 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, 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 of equipment, 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) (D)**
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**
Spring. 3 credits. Prerequisites: AEM 2200 and ECON 1110. A. Leiponen. Explores the impact of new technologies on business processes and industries. Focuses particularly on the effects of information and communication technologies (ICT). The objective is to understand the nature of information as an economic good, business opportunities and challenges created by ICT, and organizational constraints involved in exploiting these opportunities.

**AEM 3230 Managerial Accounting**
Spring. 3 credits. Priority given to CALS majors. Prerequisite: AEM 2210 or equivalent. Two evening prelims. 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 two evening prelims, a third exam, weekly homework.

**AEM 3240 Finance (also PAM 5620)**
Fall and spring. 4 credits. Priority given to CALS majors. Prerequisites: AEM 2100, 2200, and 2210, or equivalents. Three evening prelims. R. Curtis. Focuses on the mathematics of finance, valuation, and the economics of managerial decisions, corporate financial planning, capital 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 2200 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 process 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
Fall, 3290; spring, 3291. 2 credits. Prerequisites: AEM 2200 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 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 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, 1120, and AEM 2200. 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
Spring. 1 credit. Prerequisites: ECON 1110 and AEM 2200. A. Leiponen.

This course examines the institutional environment of business in Europe on different levels including national and supranational (EU) power structures, forms of business organization and governance, and culture and values. As a result of this course, students will be able to understand and be sensitive to the drivers of business behavior and performance in a foreign, particularly European, context.

AEM 3340 Women, Leadership, and Entrepreneurship (D)
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 the 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 trade agreements. 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 3290. 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 3600 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 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. 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 analyze and understand this dynamic consumer society responsibly, systematically, and creatively.

AEM 3460 Dairy Markets and Policy
Spring. 3 credits. Prerequisites: junior or senior 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. Emphasizes learning both the origin and characteristics of dairy policies and methods for analyzing their impacts on market performance.

AEM 4020 Food and Brand Lab Workshop
Fall and spring. 3 credits. 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 trip. Students must write a paper that further explores an aspect of the trip.

AEM 4040 Advanced Agricultural Finance Seminar
Spring. 3 credits. Limited to 16 students. Prerequisite: senior standing; extensive course work in farm management and farm finance. Open by application before March 1 of year before course is offered.

C. Turvey.

Special program in agricultural finance, conducted with financial support from the
Farm Credit System. Includes two days at Northeast Farm Credit offices, one week in Farm Credit Association offices, a one-day program on FSA financing during fall semester, a two- to four-day trip to financial institutions in New York City, and an actual farm consulting and credit analysis experience in the spring semester.

**AEM 4050 Agricultural Finance**
Spring. 4 credits. Prerequisite: AEM 3200 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. Introduces assumptions, properties, and problems encountered in the use of multiple regression are discussed and simultaneous equation models, simulation, and forecasting techniques.

**AEM 4120 Computational Methods for Management and Economics**
Spring. 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. 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 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. Prerequisite: junior or senior standing (priority given to AEM majors); AEM 2100 or equivalent. N. 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 out doing one's adversary at the core of the decision-making process, while anticipating that the adversary is doing 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**
Fall. 3 credits. Prerequisites: AEM 2100 and 3240 or equivalents. Recommended: ECON 3130 or equivalent and a calculus course: familiarity with calculus and probability and statistics. Priority given to AEM students. S-U or letter grades. H. Dao. Covers the pricing of derivatives and how derivatives can be used for the purpose of risk management and speculation. A portion of this course involves the use of a spreadsheet or other computer programs.

**AEM 4220 Estate Planning (also NBA 5620)**
Fall. 3 credits. 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 5240. 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 in business. 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 2200 or 3200. 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, strategic 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 2100 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 exchange rates, 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. Explores methods of policy analysis, and students learn to critique policies and write policy briefs.

AEM 4320 Public Private Sector Economics
Spring. 3 credits. Prerequisite: intermediate microeconomics course. C. K. Ranney.
The government agency and the individual business enterprise are two of the most powerful influences on the economic performance of the economy and on the lives of citizens. These relationships range from cooperative to competitive, from friendly to hostile. It is an uneasy relationship, each side possessing basic powers and yet each having an important need for the other. In the United States, the result is a mixed economy in which the public and the private sectors interact in many ways. Government exercises a variety of important powers in dealing with the individual private enterprise, ranging from taxation to regulation. Business, in turn, relies on constitutional protections as well as on public support of its basic role in creating income, employment, and material standards of living. In a dynamic and increasingly globalized economy, the business-government relationship is constantly changing and the line between public and private sectors frequently shifts. Future managers are constantly confronted with issues that relate to government-business interfaces.

AEM 4340 Government Policy Workshop (also CRP 4180, FGSS 4200)
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 4350 Entrepreneurial Leadership
Fall, weeks 1–14. 2 credits. 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
Spring. 3 credits. Prerequisites: AEM 2200 and ECON 1110. A. Leiponen.
Explores innovation and technological change. Studies how technological change affects economies and industries, how innovation of new products, processes, and services takes place in firms. Group projects involve case studies of local high-tech startup companies.

AEM 4420 Emerging Markets
Fall. 3 credits. Prerequisites: senior or graduate standing; AEM 2400 and PAM 2000 or ECON 3150. 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. 3 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 and international relations or sociology and 6 credits in nutrition and/or agricultural sciences. P. Pinstrip-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
Fall. 1 credit. Prerequisite: junior or senior standing; extensive course work in food industry management and marketing. D. J. Perosio.
The seminar covers advanced topics in food marketing, many of which have an important international dimension and are presented by industry members. A field trip may be taken. Students participate in research topics on various aspects of the food industry.

AEM 4470 Retail Speaker Series
Spring. 1 credit. D. Perosio.
Senior and guest lecturers invited to 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 views 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 2100. 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 policymakers, and consumers.

AEM 4490 Global Marketing Strategy (D)
Spring. 3 credits. Prerequisite: junior, senior, or graduate standing; marketing course. Next offered 2009–2010. Staff.
Examines opportunities and challenges in the rapidly changing global marketplace. Topics include the decision to serve a foreign market, alternative strategies for entry into foreign markets (such as exporting or establishing a local subsidiary), and issues in implementing those strategies. Includes case analysis and discussion.

AEM 4500 Resource Economics (also ECON 4500) (SBA)
Fall. 3 credits. Prerequisites: MATH 1110, ECON 3160, 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. 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. J. Lippitt.
Theory and practice of independent examination of financial statements. Discussion of relationships with clients; working papers, assurance procedures, including evaluation 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. 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 4550 Sustainability, Business and the Environment

AEM 4600 Security Trading and Market Making

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. Instructor permission is required.

AEM 4640 Economics of Agricultural Development (also ECON 4640)
Fall. 3 credits. Prerequisite: ECON 1110–1120 or permission of instructor. B. D. Charnov.
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 technological 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, spring, or summer. 1–4 credits. 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 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. Demonstrates 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. Picchio.
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 PEM 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, externalitys, and the general theory of second-best optimality. 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. 3 credits. Prerequisites: ECON 3130/314 or permission of instructor. S-U or letter grades. N. Chau and S. Kyle.
Explores both recent theoretical and methodological advances as well as practical applications in analyzing current topics and issues in open economics. 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 6340 Government Policy Workshop (also CRP 6180, FGSS 6200)
Spring. 4 credits. S-U or letter grades. M. E. Warner.
For description, see CRP 618.

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. Tornel.
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. A. Prostredt-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 value 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 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. Prerequisites: 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.

[AE6700 Economics of Consumer Demand (also PAM 6080)]
Fall. 3 credits. Prerequisites: ECON 314 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. At times allows Becker and Lancaster models of demand may be introduced.]

AEM 6690 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. Graduate students should enroll in AEM 4980. Students must register using independent study form (available in undergraduate program office in Warren Hall) S-U 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 and prerequisite core courses. 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. Students 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
Spring. 3 credits. Prerequisites: matrix algebra and statistical methods courses at level of ILRST 3110 or ECON 6090. H. Daouk. 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 I
Fall. 3 credits. Prerequisite: AEM 7000 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. Discussed 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. ECON 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 non-market valuation methods, and cost-effective market mechanism design for reducing pollution. Additional topics include information asymmetries and mechanism design for non-point 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. 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 7640 Microeconomics of International Finance
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. 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.
ANIMAL SCIENCE

ANSC 1100 Domestic Animal Biology I
Fall. 4 credits. S-U or letter grades. W. B. Currie
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. D. E. Bauman and 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, camels, 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
The course is designed to integrate concepts of physiology, immunology, growth biology, lactation, pregnancy, fiber production, and work into current production systems and 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. Course 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. Thus, the course is founded on basic biological principles with the goal of integrating the biology with current production and economic pressures.

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, retraining, 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. Staff.
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 2400 Animal Reproduction and Development
Spring. 3 credits. Prerequisite: ANSC 1100–1160 or equivalent or 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; emphasizes 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. Prereq- 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 Horses**
Fall. 3 credits. Prerequisites: ANSC 1100 and 1160 or permission of instructor. S-U or letter grades. S. A. Brooks.
Selection, management, feeding, breeding, and training of light horses.

**ANSC 2900 Meat Science (also FDSC 2900)**
Fall. 2 or 3 credits. Max 4 credits. Lab fee: $15. 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. Laboratory exercises include anatomy, meat-animal slaughter, meat cutting, wholesale and retail cut identification, inspection, grading, curing, sausage manufacture, and quality control. An all-day field trip to a commercial meat plant may be taken.

**ANSC 3100 Introduction to Animal Welfare**
Fall. 2 credits. S-U or letter grades. Staff.
Animal welfare 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. This course will provide much of the background needed for Cornell to field a team and participate in the U.S. National Animal Welfare Judging contest in the spring.

**ANSC 3200 Comparative Animal Nutrition and Toxicology: Horses, Dogs, Cats, and More**

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 nutritional 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. Offered alternate years. Y. R. Bougheir.
Comprehensive survey of the biology of the mammary gland. Lectures cover (1) basic aspects such as anatomy and development of the mammary gland; (2) hormone regulation of milk synthesis and regulation of gene expression in the mammary cells; (3) 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**
Fall. 3 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. Staff.
Application of scientific principles to practical herd management with emphasis on herd health and animal well-being. Laboratory exercises include anatomy, meat-animal slaughter, meat cutting, wholesale and retail cut identification, inspection, grading, curing, sausage manufacture, and quality control. An all-day field trip to a commercial meat plant may be taken.

**ANSC 3600 Beef Cattle**
Spring. 3 credits. Offered even-numbered years; next offered 2009–2010. M. L. Thonney.
Focuses on aspects of beef cattle nutrition and management including on-farm herd health analysis.

**ANSC 3650 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 exercises include practical applications and field trips.

**ANSC 3680 Beef Cattle**
Spring. 3 credits. Offered odd-numbered years. M. L. Thonney.
Focuses on aspects of beef cattle nutrition and management including on-farm herd health analysis.

**ANSC 3920 Mechanisms of Animal Growth and Development**
Spring. 2 credits. Prerequisites: ANSC 1100–1160 or equivalent introductory physiology course. 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 processes 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**
Spring. 3 credits. Prerequisite: one year introductory biology, ANSC 1100 or equivalent introductory physiology course. Letter grades only. X. Lei.
This course introduces features and applications of various animal models for biomedical research on human health and diseases. Emphasis will be placed on appropriate animal models for studying human diabetes, cancer, cardiovascular disease, hereditary disease, and nutritional deficiencies. Model species include food-producing animals, recreation/companion animals, and laboratory animals.

**ANSC 4000 Livestock in Tropical Farming Systems**
Comprises analyses of constraints on livestock production in developing countries of the tropics, economic objectives and risk, and methods of management. Emphasis is on strategic use of animal and plant resources, animal performance with inputs restricted, and decision making. Principles, field study, independent study projects and classroom interactions facilitate problem-solving to improve welfare of rural households.

**ANSC 4010 Dairy Production Seminar**
Spring. 1 credit. Prerequisite: 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 research and honors 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 of introductory biology and introductory physiology (ANSC 1100 and ANSC 2400, formerly ANSC 300) 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. R. E. Austic and D. E. Bauman. 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 understand how the metabolism and metabolic regulation through an integration of nutrition, biochemistry, and physiology.

**ANSC 4110 Applied Cattle Nutrition**
Fall. 4 credits. Designed for juniors, seniors, and entering graduate students. Prerequisites: ANSC 1100 and 2120 (or equivalent). Higher numbered courses are used in the laboratory to actualize the information presented in lectures. Herd case studies are used in the lab and there are field trips to farms to evaluate the nutritional management. Students develop components of a CNMP for a case study farm, using the Cornell University Nutrient Management Planning System (CNMPS) and other tools. All students enrolled learn the concepts and processes of developing the crop and manure nutrient management plan component of a CNMP during the first half of the semester in Module 1.

**ANSC 4121 Whole-Farm Nutrient Management—Module 2 (also CSS 4121)**
Spring. 2 credits. Prerequisite: enrollment in Module 1 (ANSC 4120) for first half of semester. M. E. Van Amburgh and Q. M. Ketterings. Module 2 builds on crop and manure nutrient planning (Module 1) by integrating agronomic nutrient management planning with herd nutrient management planning. Develop knowledge and skills necessary to integrate crop production and herd feeding management for reducing nutrient imports on farms. Work on case studies outside lab.

**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; use and status 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; next offered 2009–2010. J. E. Parks. Study formation, growth, differentiation, maturation, and transport of mammalian sperm and oocytes and cytological, physiological, and molecular changes required for fertilization.

**ANSC 4270 Fundamentals of Endocrinology (also BIOAP 4270)**
Fall. 3 credits. Prerequisite: animal or human physiology course or permission of instructor. Next offered 2009–2010. 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 Merchandizing Beef Cattle**
Fall. 2 credits. S-U or letter grades. M. J. Baker. Introduction to the merchandizing 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 146 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. 1–3 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 6300 Mineral Nutrition: Metabolic, Health, and Environmental Aspects (also NS 6300)
Fall. 2 credits. Prerequisites: biochemistry, physiology, and nutrition courses. Letter grades only. Offered alternate years.

X. G. Lei and C. C. McCormick.

Emphasizes absorption, metabolism, gene regulation, antioxidation, and genetic defects related to mineral nutrition. Team-taught lectures cover topics ranging from single gene mutation to social and environmental aspects of mineral nutrition and mineral-related disorders. Discusses effective approaches to improve global mineral nutrition by agriculture and food systems.

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 6900 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 9910 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.

ANSC 9910 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 6200)

Basic Immunology Lectures (BIOG 3050)

Micronutrients: Function, Homeostasis, and Assessment (NS 6310)

Regulation of Macronutrient Metabolism (NS 6320)

BIOLOGICAL AND ENVIRONMENTAL ENGINEERING

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. 1–3 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 6300 Mineral Nutrition: Metabolic, Health, and Environmental Aspects (also NS 6300)
Fall. 2 credits. Prerequisites: biochemistry, physiology, and nutrition courses. Letter grades only. Offered alternate years.

X. G. Lei and C. C. McCormick.

Emphasizes absorption, metabolism, gene regulation, antioxidation, and genetic defects related to mineral nutrition. Team-taught lectures cover topics ranging from single gene mutation to social and environmental aspects of mineral nutrition and mineral-related disorders. Discusses effective approaches to improve global mineral nutrition by agriculture and food systems.

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 6900 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 9910 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 6200)

Basic Immunology Lectures (BIOG 3050)

Micronutrients: Function, Homeostasis, and Assessment (NS 6310)

Regulation of Macronutrient Metabolism (NS 6320)

BIOLOGICAL AND ENVIRONMENTAL ENGINEERING


BEE 1110 Introduction to Metal Fabrication Techniques
Spring. 3 credits. Limited to 20 students per lab. Letter grades only. T. J. Cook.

Emphasis is on selection of proper materials and techniques to achieve successful metal fabrication, maintenance, and repair projects. Covers hand and machine tools, fasteners, strengths of materials, classification and identification of metals, sheet metal work, soldering, pipe fitting, controlling distortion, oxy-acetylene torch cutting, welding and brazing, carbon steel stick arc welding, arc cutting and use of the carbon arc torch.

BEE 1140 Introduction to Wood Construction
Fall. 3 credits. Limited to 16 students per lab. Letter grades only. T. J. Cook.

Principles and practice of wood construction. Covers site selection and preparation, drainage, water and septic development, foundations, concrete work and block construction, material properties, framing and roofing, comparison of alternatives to wood construction, use of hand and power tools, wood joining methods and joinery, fasteners and their application. Each student plans and constructs an approved carpentry project (fine furniture to livestock equipment) that will be useful, durable, and show the students ability and mastery of the subject matter.

BEE 1150 Advanced Metal Fabrication Techniques
Spring. 1 credit. Prerequisite: BEE 1110 or permission of instructor. Letter grades only. T. J. Cook.

Principles and practices beyond the scope of BEE 1110. Includes out-of-position, low-hydrogen, high-carbon steel and cast iron welding. Topics such as soldering and brazing of aluminum, hard surfacing, both tungsten (TIG) and metallic (MIG) inert gas welding, plasma arc, and oxy cutting of metals are covered. Planning, development, and fabrication of a metal construction project is required for an optional second credit.

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 those careers. 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 program 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 Biocatalysis**
Spring. 3 credits. Prerequisites: MATH 1920, BIOL 1110, PHYS 2213, and CHEM 1200, or completion or concurrent. Letter grades only. J. H. Hunter.
Living systems rely on chemical and phase equilibria, precise coordination of biochemical pathways, and the release of chemical energy to 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. 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, biology, ecology, 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. Letter grades only. A. J. Baemer.
Focuses on the integration of biological principles, 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 to their academic plan. BEE students who complete both BEE 2510 and BEE 2600 receive engineering credit for only one of these courses.

**BEE 350 Principles of Navigation (also NAVS 350)**
Spring. 4 credits. Three classes each week (lec-rec-project work). Letter grades only. L. Rainaud.
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, tide tables, 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. 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 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, conservation 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 Biophysical 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 their biovector (soil/water/air), and industrial processing of food and biomaterials.

**BEE 3600 Molecular and Cellular Biotechnology (also BME 3600)**
Spring. 3 credits. Prerequisite: BEE 2600, biology course, 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 into 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, proteomics, biotechnology, and nucleic acid engineering. Case studies in biomedical, bioprocess, and bioenvironmental engineering.

**BEE 3650 Properties of Biological Materials**
Spring. 3 credits. Satisfies BEE 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 quasi-static and dynamic testing of materials and interpretation of test results. Uses experimental techniques to determine engineering properties of these materials.

**[BEE 3660 Biotechnology Applications: Animal Bioreactors**
Fall. 3 credits. Prerequisite: biochemistry course or permission of instructor. Letter grades only. Offered alternate years; next offered 2009–2010. 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. M. T. Walter.
This is an introduction to fundamental hydrology emphasizing physical hydrological processes and the roles of interactions among hydrology, ecology, biogeochemistry, and human activities. This course focuses on the nature of surface and near surface processes and introduces deeper, groundwater-hydrology. A broad range of specific topics is covered: e.g., the hydrologic cycle, watershed hydrology, runoff generation, physical and biophysical vadose zone processes, erosion and sediment transport, and eco-hydrological systems.

**BEE 4010 Renewable Energy Systems**
Spring. 3 credits. Prerequisite: college physics. Letter grades only. L. D. Albright.
Introduces energy systems with emphasis on quantifying costs and designing/optimizing renewable energy systems. Emphasizes how 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 Sampling and Measurement**
Fall. 3 credits. Satisfies BEE laboratory experience requirement. Pre- or corequisites: fluids or hydrology course and MATH 1910. Letter grades only. Next offered 2009–2010. L. D. Geoghegan and T. S. Steenhuis.
Get wet and muddy with this course on water measurement sampling methods where science and engineering technologies are integrated to quantify, characterize, and analyze environmental engineering problems. This field-based lab course focuses on quantification of surface and subsurface water flow and quality, utilizing various measurement equipment and analytical techniques. 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 registered 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 BEE laboratory experience and BEE capstone design requirement. Prerequisites: MATH 2940, introductory computing, two semesters of physics, statistics or permission of instructor. Letter grades only. 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 BEE 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 building a model 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 techniques 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
This course examines engineering measurements of biological systems and mathematical models of animal physiology. Membrane transport, sensory organs (vision, hearing), and immune systems (Respiratory and cardiovascular systems) are investigated in laboratory experiments and problem sets associated with the laboratories. Engineering mathematics (differential equations, Fourier transforms, and Laplace transforms) are used to model and analyze physiological systems. Laboratories include wet laboratory measurements of red blood cell volume, reaction times and nerve conduction, sound production and analysis, color and spatial frequency tests of human vision, construction of a temperature controlled pacemaker circuit, use of telemetry to monitor heart rate during exercise. Design of a spirometer to measure respiratory function.

BEE 4590 Bioensors and Bioanalytical Techniques
Fall. 3 credits. Prerequisites: biochemistry and course and permission of instructor. Letter grades only. A. J. Baeumner.
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 Micro TAS 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 2920, BEE 2600 or equivalent, or permission of instructor. Offered alternate years. S-U or letter grades. J. B. Hunter.
Bioseparation is the technology 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 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)
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 4720 Watershed Engineering
Fall. 3 credits. Satisfies BEE capstone design requirement when co-registered in BEE 4900. Satisfies College of Engineering technical writing requirement when co-registered in BEE 4930. Satisfies BEE laboratory experience requirement. Prerequisite: fluid mechanics 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 BEE capstone design requirement. Prerequisites: fluids or hydrology course or permission of instructor. Letter grades only. T. S. Steenhuis and L. D. Geohring.
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 in 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 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 (watershed 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 4780 Ecological Engineering
Spring. 3 credits. Satisfies BEE capstone design requirement when co-registered in BEE 4960. Satisfies College of Engineering technical writing requirement when co-registered in BEE 4930. Satisfies BEE laboratory experience requirement. Prerequisite: fluid mechanics 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.
natural systems, the most advanced form of this new engineering direction, includes constructed wetlands, hydropodonic applications of plants in resource-recovery waste management systems, soil restoration, phytoremediation, and bioafforestation to toxics. Biomass refineries to create energy-independent communities, sustainable drinking water systems, carbon sequestration, and zero-polluting farms are future sustainable practices that also solve some of society's larger problems.

BEE 4800 Introduction to 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 atmospheric chemistry and its relation to air pollution, climate, and environmental change. It examines the chemistry and physics that determine the atmospheric composition on global scales including ozone photochemistry, atmospheric transport, the oxidizing capacity of the atmosphere, and biogeochemical cycles.

BEE 4810 LRFD-Based Engineering of Wood Structures (also CEE 4810)
Spring. 3 credits. Prerequisite: BEE capstone design requirement when co-registered in BEE 4900. 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; design 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 4870 Sustainable Energy Systems
Fall. 3 credits. Satisfies BEE capstone design requirement. Intended for upper-level undergraduate and graduate students. Prerequisites: BEE 3500 and thermodynamics course. Letter grades only. N. R. Scott and L. D. Allbright. Offers a systems approach to understanding renewable technologies (solar, wind, and biomass) and their conversion processes, from various aspects of biology, physics, engineering, environmental impacts, economics, and sustainable development.

BEE 4890 Entreprenuerial Management for Engineers
Spring. 4 credits. Satisfies College of Engineering technical writing requirement. Prerequisites: junior standing; ENGRD 2700 or CEE 4040 or equivalent highly recommended. Letter grades only. M. B. Timmons and R. A. Evans. The course focuses on how to start a new company centered on engineering or biological technologies. Course objectives include coverage of: entrepreneurship principles; fund raising, negotiation, financial calculations (internal rate of return, time value of money, proforma 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 prepared 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. 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. 1 credit. Meets College of Engineering technical writing requirement when taken concurrently with BEE 4730. Letter grades only. 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. Each 4940 has a unique course ID specific to your project advisor. S-U grades assignments, and regularly discusses objectives and techniques with the faculty member in charge of the course.

BEE 4970 Individual Study in Biological and Environmental Engineering
Fall and spring. 1–4 credits. Prerequisites: 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. 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 4990 Undergraduate Teaching
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. 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 BEE Honors Research
Fall or 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 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 siting 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 5900  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 5950  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 5950 is required for the M.Eng. degree (can be taken in two semesters).

BEE 6430  Veterinary Perspectives on Pathogen Control in Animal Manure (also VTMED/BIOMI 6430)  
Spring, eight weeks. 2 credits. Prerequisite: third- and fourth-year veterinary students. 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; next offered 2009–2010. 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 root water stress 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. R. M. Spanswick. Fundamental treatment of the transport of ions and small organic molecules in plants. Topics include electrolyphysiology of cell membranes, including ion channels and electrogenic ion pumps; transport mechanisms for the major ions; intercellular and long-distance ion transport; cotransport systems for sugars and amino acids; phloem transport; ABC-type transporters.

[BEE 6510  Bioremediation: Engineering Organisms to Clean Up the Environment  
Spring. 5 credits. Prerequisites: BIOMI 2900 or BIOBM 3350 or permission of instructor. Letter grades only. Next offered 2009–2010. B. A. Ahner. Examines ways in which organisms may be used to remove or metabolize pollutants in the environment, including bacterial degradation of organics and phyto remediation of heavy metals. Through lectures and current literature, students evaluate the benefits as well as the current obstacles. Examines the current efforts to genetically engineer organisms for bioremediation and the potential risks of releasing them into the environment.]

[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; next offered 2009–2010. 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 organisms].

[BEE 6590  Biosensors and Bioanalytical Techniques  
Fall. 3 credits. Prerequisites: biochemistry course and permission of instructor. Letter grades only. J. A. Bacunner. 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. J-Y. Parlange. Encompasses a full range from simple to complex methods to describe the chemical and water flows on the surface, in the vadose zone, and through the aquifer. Discusses current analytical, semi-analytical, and computer-based techniques. Analyzes both homogeneous and heterogeneous soils.

BEE 6720  Drainage  
Spring. 4 credits. Prerequisites: BEE 4710 or BEE 4750. 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 methodologies due 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; next offered 2009–2010. 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 of 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. Offers 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 or letter grades. A. J. Baeumner. 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. Next offered 2009–2010. 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 7870 Industrial Ecology of Agriculturally Based Bioindustries**

Spring. 3 credits. Prerequisites: graduate standing; one year of calculus, some knowledge of MATLAB, BEE 6870. Letter grades only. Offered alternate years; next offered 2009–2010. L. P. Walker. This course is designed to bring students from the life sciences and engineering together in teams to model and simulate sustainable agriculturally based bioindustries like those currently being used to produce bioenergy and biodegradable polymers. It is a system modeling and analysis course focused on interconnecting discrete physical, chemical, and biological processes to create novel industrial ecologies that are sustainable. An input/output modeling methodology is employed to develop and manipulate the structure of complex agriculturally based bioindustries and to generate the material, energy, and monetary flows. Special emphasis is placed on designing and analyzing webs of connected processes such that waste products from one process can be used as a raw material for another process. 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 7880 Biomass Conversion of Energy and Chemicals**

Spring. 3 credits. Prerequisite: one year of college calculus and chemistry; minimum of one course in thermodynamics and computer programming. Letter grades only. Offered alternate years. L. P. Walker. Biological and physical conversion of biomass to bioenergy and bioproducts. Biological and engineering concepts associated with microbial and enzymatic conversion of biomass to useful products, physical and chemical concepts associated with the pretreatment of biomass and the separation of key biomolecules. Uses mass and energy balances and mathematical models (with MATLAB) to simulate process behavior.

**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.

**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**

**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)**

Fall and summer. 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)**

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 3100)**

Fall. 3 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.
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
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
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 and methodology, parameter estimation, hypothesis testing, interval estimation, and basic asymptotic theory.

BTRY 4100 Multivariate Analysis (also ILRST 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, 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). A thorough introduction to graphical models, a flexible and powerful framework for machine learning and probabilistic modeling that combines graph theory and probability theory. Covers both directed models (Bayesian networks) and undirected models, inference and parameter learning, and exact and approximate algorithms. Special cases such as hidden Markov models, tree-like Bayesian nets, and conditional random fields are discussed in detail.

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. Next offered 2009–2010. Statistical analysis of genetic, molecular, and genomic data. Models are developed for linkage analysis, QTL mapping, 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 6850.

BTRY 4840 Computational Genomics
Fall. 4 credits. Prerequisites: BTRY 4070 and at least one course in statistical methods and at least one in algorithms. Next offered 2009–2010. Computational principles and methods for the analysis of genomic data. Topics include sequence alignment, motif finding, phylogeny reconstruction, and gene regulatory networks.

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 4950 Statistical Consulting
Fall. 2–3 credits. Pre- or corequisites: BTRY 3020 or 6020 and 4900 and permission of instructor. S-U or letter grades. Next offered 2009–2010. Participation in the Cornell Statistical Consulting Unit: Faculty-supervised statistical consulting with researchers from other disciplines.

BTRY 4960 Statistical Consulting II
Fall. 1 credit. Prerequisites: BTRY 3020 or 6020, and 4900. S-U grades only. Next offered 2009–2010. Participation in the Cornell Statistical Consulting Unit: Faculty-supervised statistical consulting with researchers from other disciplines.

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. 2 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 and summer. 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: 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 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 4110)
Spring. 3 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
Spring. 4 credits. Prerequisites: BTRY 6010 and 6020 or permission of instructor. Applications of experimental design including such advanced features as split plots, incomplete blocks, fractional factorial. 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. For description, see BTRY 4070.

BTRY 6150 Applied Functional Data Analysis
Fall. 3 credits. Prerequisites: BTRY 6010 and 6020 or permission of instructor. 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. Topics include visualization and data exploration, nonparametric smoothing, functional linear models, functional principal components analysis, analysis involving derivatives, registration, nonlinear smoothing. The course makes extensive use of MATLAB.

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. Focus is on the use of statistical 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 2102 or equivalent). Recommended: course in statistical methods (BTRY 4090 or equivalent). For description, see BTRY 4790.

BTRY 6820 Statistical Genomics
Fall. 4 credits. Prerequisite: MATH 1110. Highly recommended: at least one previous course in statistical methods and one in biology. Next offered 2009–2010. For description, see BTRY 4820.

BTRY 6830 Quantitative Genomics and Genetics
Spring. 4 credits. Prerequisites: BTRY 4070 and introductory genetics 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. Next offered 2009–2010. For description, see BTRY 4840.

BTRY 6890 Topics in Population Genetics and Genomics
Fall. 1 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

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. Next offered 2009–2010. 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 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. This course focuses on the rigorous development of nonparametric, semiparametric, and parametric modeling and statistical inference procedures appropriate for analyzing right censored data arising in single sample, k-sample, and regression problems. Tools to be discussed in detail include the Nelson-Aalen and Kaplan-Meier estimators, the logrank test, and the Cox proportional hazards and accelerated failure time regression models. Counting process notation and elementary martingale theory are used to facilitate the development of the large sample theory required for statistical estimation and testing procedures.

BTRY 7950 Statistical Consulting
Fall and spring. 2–3 credits. Prerequisites: 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 7990 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 8900 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 9900 Doctoral-Level Dissertation Research
Fall or spring. 1–9 credits. S-U grades only.
COMM 2010 Oral Communication (D)  
Fall, spring, and summer. 3 credits. B. L. Berggren.  
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 broader social concepts of modernity and post-modernity.

COMM 1101 Cases in Communication (SBA)  
Fall. 3 credits. B. L. Weisweiler.  
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 broader 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 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 applied 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 (D)  
Fall, winter, spring, or summer. 3 credits. Limited to 20 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, T. Michael, 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 (D)  
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 (D)  
Fall. 3 credits. S. Byrne.  
Introduction to media history, industry, content, policy, process, and effects.

COMM 2450 Psychology of Social Computing (also INFO 2450) (SBA)  
Fall and summer. 3 credits. J. Hancock and J. Birnholtz.  
Course focuses on understanding online communication through principles of cognitive and social psychology, and aspects of the Internet that defy traditional psychological 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 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 writing. Emphasis on organization and 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 Cases in Communication and Social Influence (SBA)  
Spring. 3 credits. Prerequisite: COMM 1101. P. McLeod.  
Social influence is one of the most basic and important functions of communication. This course introduces communication majors to the focus area of Communication and Social Influence (CSI). Through case studies, exercises and field projects the course will address issues ranging from influence between individuals to influence at national and international levels.

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) (D) (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 in Life Sciences (also STS 2851) (SBA)  
Spring. 3 credits. B. L. Weisweiler 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. S. Nelson and R. Hardesty.  
This course introduces students to advanced theories of speech communication and then demonstrates the usefulness of these theories in several different contexts, including business and professional, small groups, interpersonal, 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. S. Nelson and R. Hardesty.  
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 processes can affect group performance. The course will be taught in an interactive hands-on format that emphasizes the testing of understood theory.

COMM 3260 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)
Fall. 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 violence, 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 3450 Human–Computer Interaction Design (also INFO 3450) (SBA)
Spring. 3 credits. G. Gay 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. B. Lewenstein.
How to write about science, technology, and medicine for the mass media. Discussion topics include accuracy, simplicity, comprehensiveness, risk communication, and the history and social structure of science. Writing assignments focus on writing news and feature stories for newspapers and magazines, with excursions into web sites, blogs, and other media.

COMM 3520 Science Writing Practicum
Spring. 1 credit. Prerequisite: COMM 2600, COMM/STS 3520, ENGR 3500, or permission of instructor. B. Lewenstein.
Students cover the annual meeting of the American Association for the Advancement of Science, held in February each year. Before the meeting, students review science writing techniques and issues. At the meeting, students meet with science writers and attend press conferences and scientific sessions. Students write at least two stories. Students are responsible for all costs of travel, lodging, and meals.

COMM 3551 Computers: From the 17th Century to the Dotcom Boom (also STS 33551)
Fall. 4 credits. J. Ratcliff.
For description, see STS 3551.

COMM 3560 Writing for New Media: Theory, Analysis, and Practice
Spring. 3 credits. Prerequisites: sophomore standing and at least one college-level writing course. L. Van Buskirk and staff.
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. Prerequisites: COMM 2820 or equivalent social research course and one semester of introductory statistics. K. McComas.
Provides a theoretical and practical overview of how audiences, messages, and evaluation of communication campaigns work. 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. Prerequisites: 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 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 Community Service Practicum
Fall and spring. 1 credit; may be repeated once for credit. Meets one hour weekly. S. Nelson and R. Hardesty.
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 (D) (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. Staff.
The course provides a scientific and applied overview of the concept of “public opinion” and its implications for macrosocial processes. The concept’s historical development in fields such as political science, social psychology, and communication science is reviewed, followed by a closer look at what is meant by “measuring” public opinion. For example, is public opinion measured by summing across individual opinions, or are there macro-level dynamics of public opinion that go beyond what individuals in a society think?

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 (SBA)
Fall. 3 credits. Prerequisites: introductory psychology or HD 120 or COMM 1010 or 2820. 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 newspaper 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**
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)
Fall. 3 credits. Prerequisite: COMM/INFO 245 or permission of instructor. G. Gay and staff.
Focusses 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)
Fall. 3 credits. Prerequisite: COMM/INFO 245. Next offered 2009–2010. J. Hancock and staff.
Focusses 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. Next offered 2009–2010. 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**
Spring. 3 credits. Prerequisite: junior or senior standing or permission of instructor. Offered odd-numbered years. K. McConnell.
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 4660 Public Communication of Science and Technology (also STS 4660)**
Spring. 3 credits. Prerequisite: COMM 2850, or 3520, ENGRC 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 context in which PCST occurs, look 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 4760 Communication Fellows Program**
Fall. 2 credits. Prerequisites: Communication seniors selected based on goals and academic preparation; permission of instructor. Fee for three-day trip. $150. Next offered 2009–2010. Staff.
Series of lectures, seminars, and guest speakers exploring the planning, evaluation, and policy-making process. Includes a three-day trip to a metropolitan area to visit corporate leaders, administrative agencies, and policymakers.

**COMM 4860 Risk Communication**
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 semester-long workshop will train researchers in the sciences (including natural sciences, engineering, experimental social sciences, etc.) to communicate effectively with nonscientists such as policy makers, political stakeholders, the media, and the general public. Training activities during the weekly session will be 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 newrooms and a training session with a professional media trainer.

COMM 6100 Seminar in Social Networks
Spring. 4 credits. Prerequisite: graduate standing. C. Yuan.


COMM 6180 Communication and Persuasion
Spring. 3 credits. Prerequisite: introductory research methods course and introductory psychology or social psychology course. S. Byrne.

Focuses on theories of communication’s influence on persuasion and attitude change. Familiarizes students with a variety of social-psychological theories of attitude change and persuasion. Also applies those theories to a variety of communication situations including mass communication, advertising, public relations/public information, and interpersonal communication.

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
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, music, 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)
Fall. 3 credits. Prerequisite: graduate standing or permission of instructor. G. Gay and staff.

Graduate-level readings and research supplementing COMM/INFO 440. 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, satisfaction. Topics include formal models of people and interactions, collaborative design issues, psychological and philosophical design considerations, and cultural and social issues.

COMM 6450 CMC Graduate Seminar (also INFO 6450)
Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. Next offered 2010–2011. J. Hancock and staff.

Graduate-level readings and research supplementing COMM/INFO 445. 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)

Graduate-level readings and research supplementing COMM/INFO 450. 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 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. Birnholtz.

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 and K. McComas.

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 Theories and Methods of Small Group Research

COMM 6860 Risk Communication
Spring. 3 credits. 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. 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 of risk communication.

COMM 6910 Seminar: Topics in Communication
Fall and spring. 0 credits. S-U grades only. Staff.

Some weeks scholars from a wide variety of fields present varied topics in theory or research as it relates to communication. Other weeks graduate students present thesis proposals to faculty members and peers.

COMM 6940 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 faculty members and students.

COMM 6950 Structural Equation Modeling Techniques in Social Science Research
Fall. 3 credits. Prerequisite: course in multiple regression; graduate standing. Letter grades only. Offered even-numbered years. 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. Letter grades. 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. Letter grades only. 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. Letter grades only. 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.) Letter grades only. 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. Letter grades only. 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 a maximum of 6 credits. Prerequisite: permission of committee chair. S-U grades only. Thesis research for M.S. (communication) students.

COMM 9900 Doctoral-Level Dissertation Research
Fall or spring. 1–9 credits; may be repeated for a maximum of 9 credits. Prerequisites: completion of "A" exam; permission of committee chair. S-U grades only. Dissertation research for Ph.D. candidates.

CROP AND SOIL SCIENCES

Courses by Subject
Crop Science: 2110, 3150, 3170, 4030, 4050, 4140, 4260, 4440, 4551–4555, 6080, 6100, 6120, 6130, 6140, 6420, 6941, 7910, 8900, 9910
Environmental Information Science: 3970, 4100, 4110, 4200, 4550, 4850, 4860, 6200, 6210, 6600, 6740, 6750, 6943, 7920, 8910, 9920
Soil Science: 2600, 3210, 3620, 3630, 3650, 3720, 4120, 4600, 4720, 4850, 6630, 6660, 6670, 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. S-U or letter grades. 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 3800 Organic Food and Agriculture (also AGSCLI/HORT 3800)
Fall. 3 or 4 credits. Prerequisite: CSS 1900 or equivalent graduate course work. S-U or letter grades. 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. S-U grades only. 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 4303)
Spring. 2 credits. Sec. 2. S-U or letter grades. J. E. Thies and R. J. Herring. Of all the technological solutions to agronomic problems that have been proposed in the last few decades, none has created the ethical, cultural, religious, economic, environmental and political stances with regard to the use of transgenic crops as a tool for agricultural development. Discussions on selected topics and associated directed readings will be led by the course coordinators and invited speakers. Students will be assessed on their participation in discussions and on a written position paper in the subject area.

CSS 4940 Special Topics in Crop and Soil Sciences (undergraduate level)
Fall or spring. 4 credits max. S-U or letter grades. The department teaches “trial” courses under this number. Offers 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. S-U or letter grades. Students must register using independent study form (available in 140 Roberts Hall).

CSS 4990 Undergraduate Research
Fall or spring. Credit TBA. S-U or letter grades. 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. S-U grades only. 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 6960 Agroecological Perspectives for Sustainable Development
Fall and spring. Sec 2. 1 credit. S-U grades only. Staff. Agroecological perspectives for sustainable development.

CSS 6970 Seminar in Crop and Soil Sciences
Fall and spring. 1 credit. S-U grades only. Staff. Covers current research and selected topics in the crop and soil sciences and related fields.
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 symptomology.

**CSS 3170 Seed Science and Technology (also HORT 3170)**
Fall. 3 credits. Prerequisite: BIOL 2410 or equivalent. 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 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 evaluated. 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. Offered even-numbered years; next offered 2009–2010. 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. Offered alternate years; next offered 2009–2010. 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 Plant Responses to Environmental Stresses**
Fall. 3 credits. Prerequisite: course work in plant physiology and/or plant molecular biology or permission of instructor. Offered alternate years; next offered 2010–2011. T. L. Setter. 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 6130 Physiology and Ecology of Yield**
Spring. 3 credits. Prerequisite: plant physiology course (BIOL 2420 or 3420) or permission of instructor. T. L. Setter. Study of environmental constraints on crop–plant productivity from the perspective of key biological processes. Examines acclimation responses and genetic adaptation for temperature, light, water, compacted soil, and mineral-limited nutrient environments. Topics include photosynthesis and nitrogen assimilation, phloem translocation and partitioning; canopy-scale influences on solar radiation use efficiency; regulation of growth processes; dwarfing root, and floral/fruit/grain sinks in response to environment; seed set; water transport and stomatal regulation; root architecture and function; behavior in water-limited situations. Students will develop an ability to identify processes that are in need of improvement through optimization of crop cultural practices or genetic change.

**CSS 6140 Weed Ecology and Management**
Spring. 3 credits. Prerequisite: CSS 3150 or equivalent. Offered odd-numbered years; next offered 2010–2011. A. DiTommaso. Examination of plant ecological principles governing weed population dynamics and weed-crop competitive interactions in different crop and noncrop ecosystems. Explores the application of these fundamentals for the development and implementation of environmentally sound and sustainable integrated weed management strategies. Topics include seed biology and seedbank dynamics, weed demography and spatial variation, weed-crop interference, invasive weed biology, biological weed control, and site-specific weed management.

**CSS 6420 Mineral Nutrition: From Plants to Humans (also BIOLP 6420)**
Spring. 3 credits. Prerequisite: BIOLP 3410 or equivalent. Offered odd-numbered years; next offered 2009–2010. O. Vatamanuk, L. V. Kochian, and R. M. Welch. This course focuses on the biophysical, biochemical, molecular and physiological processes by which plants absorb mineral nutrients from the soil, translocate, and utilize them for growth and development. Selected lectures will focus on the relation between the nutrient status of plants and human nutrition and health. Students will be also exposed to state-of-the-art techniques that are used for analyses of mineral status of plants.

**CSS 6941 Special Topics in Crop Science**
Fall or spring. 1–6 credits. S-U or letter grades. 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. 0–6 credits. S-U grades only. Graduate faculty. Thesis research for Ph.D. students before “A” exam has been passed.
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 agronomic 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. Contact instructor to arrange group meeting times late in spring semester.

CSS 4850 Problem Solving in Environmental and Agroecosystem Science I
Fall. 4 credits. Prerequisite: senior standing, CSS 2600 or equivalent. Next offered 2009–2010. Staff.
Capstone experience for seniors, centering on the multidisciplinary analysis of a specific problem (e.g., a brownfield in Ithaca in fall 2004), with a number of faculty members serving as technical resources and lecturing as needed. Involves field trips, in-depth discussions of data assembled before the course, gathering of relevant scientific information, data interpretation, and report writing. Students are expected to work approximately 15 hours per week on a range of assignments. The course is conceived as the first of a sequence of two complementary courses, but it can be taken alone.

CSS 4860 Problem Solving in Environmental and Agroecosystem Science II
Spring. 4 credits. Prerequisite: senior standing, CSS 4850. Next offered 2009–2010. Staff.
Capstone experience for seniors, in continuation of CSS 4850. Students work in groups to carry out the laboratory measurements identified in the fall, with faculty members serving as technical support and lecturing as needed. Students are expected to work approximately 15 hours per week on a range of laboratory measurements. The results of these measurements are discussed as they become available and are combined with the rest of the assembled information to come up with recommendations about the management of the targeted problem (e.g., in spring 2005, a brownfield in Ithaca).

CSS 6200 Spatial Modeling and Analysis
Spring. 3 credits. Prerequisites: CSS 4110 or CSS 4200, or equivalent or permission of instructor. 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; offered after spring break 2009. 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 8600 Remote Sensing Fundamentals (also CEE 6100)
Fall. 3 credits. Prerequisite: permission of instructor. W. D. Phulpot.
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 8740 Environmental Genomics
Fall. 2 credits. S-U or letter grades. Offered alternate years; next offered 2009–2010. D. Buckley.
This course surveys genomic and metagenomic approaches to characterizing microbial-environment interactions and the evolution and activity of microorganisms at individual, population, and ecosystem scales.

CSS 8750 Modeling the Soil-Plant-Airosphere System (also EAS 6750)
Spring. 3 credits. Prerequisite: EAS/CSS 4830 or equivalent. Offered alternate years. S. J. Riba.
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 8910 Master’s-Level Thesis Research in Environmental Information Science
Fall or spring. 1–6 credits. S-U or letter grades. 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 9920 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 9910 Doctoral-Level Dissertation Research
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: BIOEE 2610 or BIOMI 2900 or CSS 2600 or permission of instructor. Offered alternate years; next offered 2009–2010. E. L. Madsen.
Discusses the biology, behavior, and function of microorganisms in natural environments in relation to present and potential 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 pollutants, chemical inputs, and environmental biotechnology.

CSS 4100 The GMO Debate: Environmental Impacts
Spring. 3 credits. Prerequisite: BIOG 1109 or equivalent. D. Buckley and P. Hobbs.
This course covers issues pertaining to the agricultural use of genetically modified organisms with emphasis on evaluating their environmental impact. Students will learn to critically evaluate the risks of benefits associated with the use of GMOs. We will examine the types of GMOs in use and development, how they are made, and their potential impacts on the environment including: gene flow, non-target effects, horizontal gene transfer, biodiversity effects and the implications of changes in farming practices and chemical inputs.

CSS 4110 Environmental Information Science (also CEE 4110)
Spring. 3 credits. Prerequisite: permission of instructor. Letter grades only. S. DeGloria and S. Hoskins.
Survey of geo-spatial data and information applied to the science of natural and environmental systems. Experimental 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 4860 Problem Solving in Environmental and Agroecosystem Science I
Fall. 4 credits. Prerequisite: senior standing, CSS 2600 or equivalent. Next offered 2009–2010. Staff.
Capstone experience for seniors, centering on the multidisciplinary analysis of a specific problem (e.g., a brownfield in Ithaca in fall 2004), with a number of faculty members serving as technical resources and lecturing as needed. Involves field trips, in-depth discussions of data assembled before the course, gathering of relevant scientific information, data interpretation, and report writing. Students are expected to work approximately 15 hours per week on a range of assignments. The course is conceived as the first of a sequence of two complementary courses, but it can be taken alone.
Soil Science

CSS 2600  
**Soil Science**  
Fall. 4 credits. S-U or letter grades. J. Russell-Anelli.  
This course is 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 identification, 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 260 or equivalent. S-U or letter grades. 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: CSS 260 or equivalent. S-U or letter grades. J. Russell-Anelli.  
This course presents the principles for field identification of soil profiles, 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 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 1500. M. B. McBride.  
This course covers 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. It gives particular attention to soil's function as a filter for contaminants. Describes the hazards 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. 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 will have hands-on training in analytical procedures and expand knowledge in discussion groups and through oral as well as poster presentations.

CSS 4120  
**Whole-Farm Nutrient Management (also ANSC 4120)**  
Spring. 2- or 4-credit option. Prerequisite: ANSC 4110; junior, senior, or graduate standing. Offered as two modules. Enrollment in Module 1 for first half of semester required (2 credits); consists of crop and manure nutrient management plans for CALS students. Enrollment in Module 2 for second half of semester optional (additional 2 credits). M. E. VanAmhurgh and Q. M. Ketterings.  
For description, see ANSC 4120.

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 and biological control of plant pathogens, biogeochemistry of unique habitats, bio-remediation and composting of organic wastes, among others. Laboratory focuses on molecular activities and traditional methods for assessing 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 how nutrient management can be improved without creating environmental hazards. Students will have hands-on training in analytical procedures and expand knowledge in discussion groups and through oral as well as poster presentations.

CSS 6720  
**Nutrient Cycling in Natural and Managed Ecosystems**  
Fall. 3 credits. Prerequisite: CSS 3720 or NTRES 3210 or BIOE 4780, or permission of instructor. J. Lehmann.  
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 will have hands-on training in analytical procedures and expand knowledge in discussion groups and through oral as well as poster presentations.

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.
Covers nutrient cycling in soil and the interface between the soil and the biosphere, atmosphere, and hydrosphere. Examines the biogeochemistry of nutrient elements in natural ecosystems, disturbed or degraded ecosystems, and agricultural systems, including pollution in watersheds. Students develop independent projects, present a research proposal, and conduct field research that culminates in a presentation and a paper in publishable format.

**CSS 6840 Topics in Soil Microbial Ecology**
Fall. 1 credit. Disc. S-U grades. Offered alternate years. 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. S-U or letter grades. 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 9920 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 9990 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.

**DEVOLPMENT SOCIOLOGY**

**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 Program brochure 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. L. Williams. This course provides an introduction to population studies. The primary focus is on 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, immigration, urban growth and urbanization, resource allocation, and the environment.

**DSOC 2050 International Development (also SOC 2206) (SBA) (D)**
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, multinational 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 2203) (SBA)**
For description, see SOC 2028.

**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. Careful attention is given to Latino populations, discussion encompasses other minorities who face similar problems.

**DSOC 2220 Controversies About Inequality**
For description, see SOC 2220.

**DSOC 2750 Immigration and a Changing America (D) (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)**
Fall. 3 credits. Prerequisite: introductory social science course or permission of instructor. Letter grades. P. Eloundou-Enygue. 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, and then examines the individual and societal functions of education, from theooretical 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)
Fall. 3 credits. P. Eloundou-Enyegue. This course is an introduction to social sciences research. It covers all steps in the research process through which social scientists derive credible answers to important questions about social change and social influences on individual behavior. It covers the general process from the formulation of a research question to the final presentation of findings. The course is designed as a preface for future work in social science research and it is recommended for students who simply want to sharpen their capacity to evaluate the claims made by researchers.

DSOC 3140 Spatial Thinking, GIS, and Related Methods (SBA) (KCM)
Spring. 4 credits. 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 justice. 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, 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 2992, LATAM 3290) (SBA)
Spring. 3 credits. Prerequisite: introductory sociology recommended. S-U or letter grades. G. Flores-Macías. 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. Knowledge of Spanish or Portuguese is not required.

DSOC 3310 Environmental Governance
For description, see NTRES 3310.

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 (also 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)
Spring. 3 credits. Prerequisite: DSOC 101 or permission of instructor. R. Mize. Critical explorations 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) (D) (SBA)
Fall. 3 credits. Prerequisite: introductory social science course. Staff. Reviews both classical and contemporary theories 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 patterns 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) (D) (SBA) (HA)
Spring. 3 credits. Prerequisite: DSOC 101 or permission of instructor. Letter grades only. R. L. Mizrahi. 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) (D) (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 prescitions will be evaluated and new innovative approaches proposed.

DSOC 4210 Theories of Reproduction (also SOC 4210) (D) (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 4320 Environmental Strategies
For description, see NTRES 4320.

DSOC 4630 Islam in Africa and Its Diaspora
For description, see ASRC 4630.

DSOC 4870 Global Conflict and Terrorism (SBA) (KCM)
Spring. 3 credits. A. 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 readings. May be repeated for credit.

DSOC 4890 Independent Study in Development Sociology (SBA)
Fall or spring. 3 credits, variable; may be repeated for credit. May be used to prepare for DSOC 5000 during the spring term. Students must register using independent study form (available in 140 Roberts Hall). S-U or letter grades. Involves 1-3 credits of independent study, research experience, or public service experience.
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 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 6030 Classical Sociological Theory
Fall. 4 credits. Prerequisite: graduate standing. 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 603 or permission of instructor. F. Malkki.
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. Gurak.
Introduction to the major 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
Fall. 3 credits. Letter grades only. L. Williams.
Seminar introducing students to a number of qualitative research methods in the social sciences. Discusses field observation, archival research, in-depth individual interviews, and focus group interviews. Assesses the strengths and weaknesses of various strategies of field research and consider a range of practical matters such as choice of research site (and sample where appropriate). We discuss choice of research questions and issues of feasibility in research plans. Highlights ethical considerations.

DSOC 6170 Foundations in Social Research: Comparative Epistemologies
Fall. 3 credits. Letter grades only. S. Feldman.
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. J. Francis.
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)
Spring. 3 credits. Prerequisite: graduate students only. S-U or letter grades. D. Brown.
This graduate seminar critically analyzes the intellectual core of community sociology and its theoretical development over time. "Community," as a concept, is often reified and rarely critically examined, hence the course begins by clarifying the various ways in which "community" has been conceptualized and operationalized by sociologists. The course provides students with both a grounded conceptual foundation and an overview of multiple strategies for conducting research on community structure and change in the United States and internationally. The course includes a critical examination of the forms and shapes of sociological research on the community assumes. A case study approach is used to examine the assumptions driving the methods and analysis of both contemporary and historical research.

DSOC 6250 State, Economy, and Society (SBA) (HA)
Fall. 3 credits. Prerequisite: graduate students only. P. D. McMichael.
Reviews major issues concerning the relations between political and economic institutions and the role of states, markets, firms, social movements, and cultural institutions in the process of social change. Theoretical perspectives are drawn from classical and modern social theory, including the application of comparative and world/historical methodologies.

DSOC 6320 Environmental Governance
For description, see NTRES 3310.

DSOC 6400 Community and Changing Property Institutions (SBA)
Fall. 3 credits. Prerequisite: graduate students only. C. C. Geisler.
The "ownership society" assumes multiple forms. The seminar focuses on property in land and acquaints students with the origin and evolution of property rights. It traces major property debates (aboriginal ownership vs. terra nullius; private versus public (and mixed) ownerships; the tragedy (versus the opportunity) of the commons; takings vs. giving as well as abiding property topics with which social scientists should be familiar (the "new" property; property rights as human rights, and new currents in land reform).

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 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 7920 Development Sociology
Fall or spring. 1–3 credits. Prerequisite: requirements for honors program met. A. Gonzales.
Participation in the ongoing teaching program of the department.

DSOC 8900 Master’s-Level Thesis Research
Fall or spring. Credit TBA. Prerequisite: 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

General Courses
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 an 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 130; MATH 1110 or equivalent. N. Mahowald and B. Belcher.
Introduction to Fortran computer programming and visual software packages specifically tailored for meteorological applications using packages such as BORTN 90 (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 http://www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

EAS 4890 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 1350.

EAS 1330 Basic Meteorology Lab
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. The course is intended to serve as preparation for Observers Examination.

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. K. H. Cook.
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
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. A. T. DeGaetano.
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. K. H. Cook.
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
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 4700 Physical Meteorology
Fall. 3 credits. Prerequisites: one year each of calculus and physics. Offered alternate years; next offered 2009–2010. 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. Next offered 2009–2010. 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. M. W. Wysocki. Examines sources, effects, transport, measurement, and controls of air pollution. Discusses the basic principles in each area with an emphasis on their local, regional, and global impacts.

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 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 Environmental Biophysics (also CSS 4830)
Fall. 4 credits. Prerequisite: CSS 2600 or equivalent, calculus. 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 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. Prerequisites: 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 TBD. S-U grades only. Students must register using independent study form. Staff. Independent research on current problems in atmospheric science.
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.
Thesis 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. G. Chronicos.
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. Csine.
Introductory survey course for anyone interested in dinosaurs. Lectures examine the fossil evidence and illustrate how various biological and geological 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. Csine.
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 and strategic resource. Covers techniques for locating and characterizing earthquakes and assessing the damage they cause; methods of using sound waves to image the Earth's interior to search for strategic minerals; and the historical importance of such resources. Includes seismic experiments on campus to probe for groundwater, the new critical resource. Covers techniques for locating and characterizing earthquakes and assessing the damage they cause; methods of using sound waves to image the Earth's interior to search for strategic minerals; and the historical importance of such resources. Includes seismic experiments on campus to probe for groundwater, the new critical environmental resource.

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 explores 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 1700 Evolution of the Earth and Life (also BIOG 1700)
Spring. 3 credits. J. L. Csine.
Earth system's 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, G4 Stimson Hall, or visit www.sml.cornell.edu.

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 1120 or 1920 and CHEM 2070 or equivalent. 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. L. A. Derry and 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 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 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 1112/1121; 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 the 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; next offered 2009–2010.
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 work 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 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, but the course will emphasize the basic physical principles at play, and not just the mathematical results. Student presentations of recent research papers will elaborate principles learned in the course.

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; future year 2010–2011. J. Phipps-Morgan.
Quantitative study of the deformation, heat transport, and melting processes that have shaped the evolution of the Earth. Familiar physical and chemical principles and concepts are applied to 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; next offered 2009–2010. 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. J. Phipps-Morgan.
This course will use geological, geochemical, and geophysical data 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 processes of complex faulting, melting, and fluid flow processes at subduction zones where seafloor is transformed into mantle and crust. There will be a lab section focused on the use of GMT to make maps of relevant geological and geophysical information.

EAS 4170 Field Mapping in Argentina
Summer. 3 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 various 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 Aries.

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 weekend field trip. Offered alternate years; next offered 2009–2010. 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. Offered alternate years. C. Andronicos.

EAS 4340 Exploration Geophysics
Fall. 3 credits. Prerequisites: MATH 1920 and PHYS 2208, 2213, or equivalent. Offered alternate years; future year 2010–2011. L. D. Brown.
Fundamentals of subsurface imaging by multichannel seismic reflection techniques as used in oil exploration and geohydrological investigations. Covers survey design, acquisition, analysis, processing, and interpretation in both 2-D and 3-D. Includes discussion of related techniques such as seismic refraction analysis, tomographic inversion, vertical seismic profiling, shear wave exploration, and ground-penetrating radar. Lab is keyed to state-of-the-art seismic processing, modeling, and interpretation software from LandMark.

EAS 4370 Geophysical Field Methods in Marine Geology
Fall. 3 credits. Prerequisites: PHYS 2208 or 2213, or permission of instructor. Offered alternate years; next offered 2009–2010. L. D. Brown.
[EAS 4400 Seminar on Climate Change Science, Impacts, and Mitigation]
Fall. 2 credits. Prerequisites: junior or higher standing. Offered alternate years; next offered 2009–2010. M. Mahowald. The course will focus on reading, understanding, and evaluating the IPCC report (2007 version).

EAS 4530 Mineralogy
Fall. 4 credits. Prerequisite: EAS 1101 or 2200 and CHEM 2070 or 2090 or permission of instructor. S. Mahburg 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 projects. Includes use of electron microprobe (EPMA) and x-ray facilities.

EAS 4540 Petrology and Geochemistry
Spring. 4 credits. Prerequisite: EAS 4530 or permission of instructor. Offered alternate years; next offered 2010–2011. R. W. Kay. Covers crystallography and crystal chemistry of minerals and methods of their study. Includes x-ray diffraction, optical methods, and computer simulation of crystal structures. Emphasizes effects of high pressures and temperatures with implications for understanding the Earth’s interior.

EAS 4550 Geochemistry
Fall. 4 credits. Prerequisites: CHEM 2070 or 2090 and MATH 1920 or equivalent. Recommended: EAS 3040. Offered alternate years; next offered 2009–2010. W. M. White. The Earth from a chemical perspective.

EAS 4580 Volcanology

EAS 4600 Late Quaternary Paleoecology
Fall. 4 credits. Offered alternate years; future year 2010–2011. M. Goman. Explores topics in Late Quaternary paleoecology. Broadly divides into sections: (1) lectures that cover a variety of topics, such as philosophy of paleoecology, 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; next offered 2009–2010. 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. C. D. Harvell and C. H. Greene. For description, see BIOEE 4620.

EAS 4710 Introduction to Groundwater (also ECE 4700)
Spring. 3 credits. Prerequisite: MATH 2940, fluid mechanics or hydrology course. Offered alternate years; next offered 2009–2010. L. M. Cathles and T. S. Steenhuys. Intermediate-level study of aquifer geology, groundwater flow, and contamination of aquifers and clean-up methods.

EAS 4750 Special Topics in Oceanography
Fall, spring, summer. 2–6 credits, variable. Prerequisites: completion 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; next offered 2009–2010. 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 5010 or permission of instructor. Offered alternate years; future year 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 at scales ranging from beds to entire basins. Considers physical correlation, dating techniques, and time resolution in sedimentary rocks as well as physical controls on the stratigraphic record and numerical modeling.

EAS 4790 Paleobiology (also BIOEE 4790)
Spring. 4 credits. Prerequisites: one year of introductory biology and BIOEE 2740 or 3750 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 4810 Survey of Earth Systems
Fall, spring. 2 credits. Fall, R. Kay; spring, J. Cisne. Weekly seminar for seniors in the Science of Earth Systems major on current topics in Earth system science. Readings, presentations, and discussions will focus on results from the recent literature, including how to analyze a scientific paper, and exploration of connections across the subdisciplines in the field. The course will serve as both a review of key concepts, and a vehicle to explore developing concepts in the field.

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 employed. 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 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.
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 4200 and permission of instructor. Offered alternate years; next offered 2009–2010.  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 fabric 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 4200 and permission of instructor. Offered alternate years; next offered 2009–2010.  R. W. Kay.

**EAS 5750 Planetary Atmospheres (also ASTRO 6575)**

**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.  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 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.  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; Eigen-analysis of linear systems; feedback and nonlinear cases, problems of uncertainties in natural systems; modeling software such as Stella II and MATLAB; and applications to current research of participants or from recent literature.

**EAS 6560 Isotope Geochemistry**
Spring. 3 credits. Open to undergraduates. Prerequisite: EAS 4550 or permission of instructor. Offered alternate years.  W. M. White. Nucleosynthetic processes and the isotopic abundance of the elements, geochronology, and cosmochronology using radioactive decay schemes, including U-Ph, Rb-Sr, Sm-Nd, K-Ar, U-series isotopes, and cosmogenic isotopes such as 14C and 36Cl. Use of radiogenic and stable isotope evidence regarding the formation of the Earth and the solar system. Stable isotopes and their use in geothermometry, ore petrogenesis, and the global climate system.

**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. 2 credits. Offered alternate years.  R. W. Allmendinger.

**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. Phihps Morgan.

**EAS 7500 Satellite Remote Sensing in Biological Oceanography**
Summer. B. C. Monger
In this service-learning course, students participate in team projects; attend research opportunities in agricultural 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.

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. B. Heath-Camp. 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 classroom settings and includes a minimum of 40 hours of fieldwork in area classrooms.

EDUC 4040 Learning and Teaching I
Fall. 4 credits. Prerequisite: admission to Cornell Teacher Education program or permission of instructor. Letter grades. 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. 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 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 grades. 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
Spring. 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 Multiculturalism and Education (also AMST/LSP 4510) (D)
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) (D)
Fall. 3 credits. 4 in College of Arts and Sciences. N. Assié-Lumumba. Deals with educational innovations geared to promoting equal opportunity based on gender, race and class, in Africa and the African Diaspora. After introducing the concepts and theories of education and innovations and the stages of innovation as planned change, the course focuses on concrete cases and different types of educational innovations. Selected case studies from the United States, include the creation and expansion of historically black institutions with a focus on Tuskegee Institute (now Tuskegee University), Lincoln University, Spelman College, and the Westside Preparatory School in Chicago. The African cases studied include African languages for instruction in Nigeria, science education also in Nigeria, Ujamaa and education for self-reliance in Tanzania, classroom action research in Lesotho, Information Communication Technologies (ICTs) in African higher education with a focus on African Virtual Universities (AVU), the application of the Global Development Learning Network (GDLN) in Côte d’Ivoire, and OnLine learning in South Africa.

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 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 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. Examines the relationship between education and individual and national development. Besides human capital theory, different paradigms of development, including modernization and dependency theories, and Third World Forum, are examined. Issues discussed include schooling and nonformal education; the role of primary, secondary, and higher education in development, and the issues related to employment, national migration and international brain drain, language, equity in access, output, and outcome based on social class, ethnicity, race, gender, and nationality. Finally, the information and communication technologies (ICTs), indigenous knowledge systems, and the role of higher education in the national, regional, and international contexts and cooperation are discussed.

EDUC 5320 Educational Programs in Agricultural Science
Fall. 3 credits. W. Camp. Overview of the organization and planning processes necessary to operate a successful agricultural science education program in the public schools. Topics include local needs assessments, agricultural advisory boards, community-partnering strategies, program planning, course development, sequencing instruction, professional development. Fieldwork provides experience with New York agricultural education students, teachers, and programs.

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 agriculture education programs, 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. B. Heath-Camp. 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. Experiences will be designed to assist in identifying the educational needs of clients/students, selecting curriculum content, designing curricula, and delivering the curriculum.

EDUC 5710 Social and Political Context of American Education (also SOC 5710) (HA) (SBA) (D)
Fall. 3 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 5710.1 Social and Political Context of American Education Required Discussion Section (also SOC 5710.1)***

Fall. 1 credit. Required sec for 1 credit. Must be taken with EDUC 5710 Social and Political Context of American Education.

J. Sipple.

**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.

Begin 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)(D)***

Fall. 3 credits. S-U or letter grades. Offered alternate years. D. Schrader.

This seminar explores concepts of personal epistemological development and how social context and gender influence how we know and how we think. We examine the dynamic interactions between individuals' view of the nature of knowledge, metacognitive awareness of thought processes and strategies, and social contexts of education and real life.

**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; next offered 2009–2010. 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 informal and formal learning settings are welcomed.

**EDUC 6200 Internship in Education***

Fall or spring. 1–4 credits. S-U or letter grades. Each student, before course enrollment, must obtain approval of faculty member who will assume responsibility for supervising work. Staff. Opportunity for practical experience in educational professions development.

**EDUC 6210 Work-Experience Coordinator Certification Course I***

Summer. 3 credits. Prerequisite for EDUC 6220. S-U or letter grades.

First of two-course sequence designed to meet state certification requirements for Coordinator of Diversified Cooperative Work Experience programs.

**EDUC 6220 Work-Experience Coordinator Certification Course II***


Second of two-course sequence designed to meet state certification requirements for Coordinator of Diversified Cooperative Work Experience programs.

**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. R. 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 Administration 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. Constanas.

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 this 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. Next offered 2009-2010. 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 6680 Narrative Inquiry in Social Science and Action Research**
Spring, 3 credits. S-U or letter grades. S. Peters. Provides an introduction to the theory and practice of narrative inquiry in action-oriented social science research. It includes a range of theoretical and practical topics related to narrative inquiry, taking an approach that combines seminar and workshop formats. Class sessions and assignments provide students with opportunities to practice elements of narrative inquiry, and to develop draft proposals for research projects that incorporate a narrative orientation.

**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, the.goBack 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 6800 Foundations of Adult and Extension Education**
Fall, 3 credits. Limited to 20 students. S-U or letter grades. Staff. 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. S. Peters. Explores the actual and potential connections between democracy, science, and education. The first half of the course examines several different models and theories of democracy. Attention is focused on how the nature and practice of citizenship and politics are conceptualized under each of these models, and the implications of these conceptualizations for the political and civic educations of roles of teachers, scientists, adult educators, community development practitioners, and community organizers. The second half of the course involves a critical examination of the roles that scientists, experts, technologies, and knowledge do, might, and/or should play in addressing social problems.

**EDUC 6820 Community Education and Development**
Fall, 3 credits. Limited to 25 students. S-U or letter grades. S. Peters. Offers an opportunity for students to engage in a critical study of the purposes and practices of professional organizers and educators in community and economic development initiatives. The course places a special focus on the civic or democratic dimensions of educational practice. Civic practice in community education and development is viewed in relation to the craft of “educational organizing” as a vehicle for social learning and collective action. Key philosophies and traditions of educational organizing are studied and analyzed in their historical, cultural, social, and political context, with an eye toward implications for contemporary practice in a broad 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 with conceptualizations 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 institutional and program levels, major development issues at national and global levels, and ethical practice. Examines two majors 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. Permission: permission of instructor. S-U or letter grades. Staff. Topics TBA.

**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 predominantly involves library research and independent study.

**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. G. Applebee. Forum for discussion and critical analyses of participatory research and extension approaches in agriculture and natural resource management in the complex and diverse environments characteristic of many developing countries. Theoretical and philosophical arguments that underpin participatory research and extension, as well as current tools and techniques for facilitating participation and social learning are examined. Case studies and individual projects related to farmer-centered research and extension provide a focus for analyses. The course also explores and pays special attention to the challenges and opportunities related to institutionalization of participatory research and extension for sustainable agriculture and natural resource management.

**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

Courses by Subject
Apiculture: 2600, 2640
Behavior: 2150, 3150, 3250, 3940, 4710, 6620
Conservation: 3440
Ecology: 3690, 4520, 4550, 4560, 4700, 6720, 7570
Introductory courses: 2010, 2100, 2120, 2150, 2410
Medical and veterinary entomology: 2100, 3520, 3530, 4100, 4110
Morphology: 3220
Outreach: 3550, 3560
Pathology: 4630, 6700
Pest management: 2410, 2770, 4200, 4410, 4470, 4770, 6470, 6700
Physiology, development, and toxicology: 3070, 3940, 4000, 4830, 4900, 6850
Systematics: 3110, 3311, 3330, 4400, 4530, 6340, 6350, 6550

ENTOM 2100 Alien Empire: Bizarre Biology of the Insect Origins
Spring. 2 or 3 credits. S-U or letter grades.
Optional field trips. B. N. Danforth.
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, dyestuffs, 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 2100 Plagues and People (also BSOC 2101)]
Fall. 2 or 3 credits. Prerequisites: introductory biology or permission of instructor. Offered alternate years; next offered 2009–2010. Lec, lab (also TOX 3700).Fall. 2 credits. 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, 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. 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. Also includes lectures on pollination of agricultural crops, honey and beeswax, bees in ancient and modern rituals, Africanized honey bees, and insect politics.

ENTOM 2640 Practical Beekeeping
Fall. 1 credit. Limited to 20 students. Pre- or corequisite: ENTOM 2600. Lab. 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. Topics include management of bees for pollination, honey harvesting and processing, wax processing and candle making, and disease identification/control. The class makes a number of field trips to commercial beekeeping operations. Students conduct simple experiments to demonstrate color and odor perception by bees, as well as the chemical basis of swarming, nest guarding, and mating.

ENTOM 2770 Invasive Species and Natural Enemies
Spring. 2–3 credits. S-U grades optional. Lec, lab, demonstration; optional field trip, optional disc session offered for 1 credit. Lec. W. M. Tingey. The purpose of this course is for students to learn about the looming problems caused by invasive species and use of biological control against invasives and other pests. These topics are obviously germane in biology; however, they have social, economic and philosophical links. Many research projects on invasive species and biological control are conducted on Cornell campus; examples of research will be provided, including talks by guest lecturers. Subjects covered will include basic concepts of biological invasion and biological control. These subjects fit well together because one of the first lines of defense against invasive species is use of biological control. Moreover, the effects of invasive species impact agriculture but also increasingly affect and can permanently change natural systems. Natural enemies used for biological control that will be discussed include predators, parasitoids, pathogens, herbivores and antagonists to control vertebrate, invertebrate, and microbial pests and weeds.

ENTOM 2120 Insect Biology
Fall. 4 credits. Prerequisites: BIOG 1101–1102 or equivalent. Lec, lab/disc. A. Hajek and J. Nyrop. An 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 3150 Spider Biology
Fall. 3 credits. Prerequisites: introductory biology or permission of instructor. Letter grades only. Lec. L. S. Rayor. 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
Spring. 3 credits. Prerequisites: introductory biology and either ENTOM 2120 or BIONB 2210. Lec. Offered alternate years. L. S. Rayor. 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; next offered 2009–2010. L. C. Harrington. 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: ENTO 2120 lab. Lab fee: $40. Corequisite: ENTO 3310. Next offered 2009–2010. 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 Outworms: Larval Insect Biology
Spring. 3 credits. Prerequisites: ENTO 2120 or permission of instructor. S-U or letter grades. Offered alternate years; next offered 2009–2010. 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: ENTO 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 3340 Insect Conservation Biology
Spring. 3 credits. Prerequisite: entomology or conservation biology course or permission of instructor. S-U or letter grades. L. C. Harrington. In-depth look at the concepts and issues surrounding the conservation of insects and other invertebrates. Topics include sampling rare populations; insect conservation genetics; the role of phylogeny in determining conservation priorities; refuge design; saving individual species; the unique political, social, and ethical aspects of insect conservation and preservation of their ecological services (i.e., pollination, decomposition, pest suppression, and insectivore food sources).

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. L. C. Harrington. Diseases resulting from arthropod-borne pathogens (such as malaria, West Nile virus, dengue, and yellow fever) cause considerable human and animal suffering and death worldwide. This course explores the impact of vector-borne disease and provides a comprehensive overview of the fields of medical and veterinary entomology. The goal is to encourage an understanding of evolutionary and ecological issues associated with disease transmission. 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. Prerequisite: ENTO 3520 at the same time or have taken another Medical/Veterinary Entomology course. S-U or letter grades. Offered alternate years. L. C. Harrington. The laboratory compliments the lecture course, ENTO 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/BION 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 equivalent, or permission of instructor. S-U or letter grades. L. C. Agrawal, G. Jander, A. Kessler, and J. Thaler. For description, see BIOEE 3690.

ENTOM 3940 Circadian Rhythms (also PLPA/BIOGD/BION 3940)
Fall. 2 credits. Corequisite lab (3941). Prerequisite: 2000-level biology. S-U or letter grades. K. Lee. For description, see PLPA 3940.

ENTOM 4101–4110 Malaria Interventions in Ghana
4101, fall; 4110, 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 in the spring semester, 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 4110 Primary Health Care in Honduras
Spring. 2 credits. S-U grades only. L. C. Harrington. Honduras is a country rich in natural resources, beauty and culture, however, the people face significant public health challenges. This service-learning course will teach people about Honduran culture, politics and history as well as health care.

The course will prepare students for a summer internship opportunity at the La Guacamaya Clinic in Yoro.

ENTOM 4200 Grape Pest Management (also PLPA 4200)
ENTOM 4400 Phylogenetic Systematics (also BIOPL 4400)
ENTOM 4440 Integrated Pest Management (also CSS 4440)
Fall. 5 or 4 credits with lab. 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 4530 Principles and Practice of Historical Biogeography (also BIOPL 4530)
Fall. 3 credits. Prerequisite: systematics course or permission of instructor. S-U or letter grades. Lec, lab. Offered alternate years; next offered 2009–2010. J. K. Liebherr and M. Luckow. Survey of techniques in historical biogeography, and the development of modern biogeographic theory in the context of classical, ecological, and phylogenetic analytical methods. Presents geological and paleontological aspects of biogeography and discusses large-scale biogeographic patterns. Labs focus on computer applications and discussion of controversial issues.

ENTOM 4550 Insect Ecology (also BIOEE 4550)
Fall. 4 credits. Recommended: ENTO 2120 or BIOEE 2610 or permission of instructor. S-U or letter grades. Offered alternate years. J. S. Thaler. Focuses on individual and population aspects of insect ecology as well as some topics in community and ecosystem ecology. Emphasizes the importance of interactions with the biotic and abiotic environment. Laboratory includes indoor and outdoor field trips illustrating the major concepts in insect ecology as well as experimental techniques.

ENTOM 4630 Invertebrate Pathology
Fall. 3 credits. Prerequisites: one year introductory biology. S-U or letter grades. Lec, lab. Offered alternate years. A. E. Hajek. Lecture presents principles of pathology as applied to invertebrates. Topics include noninfectious and infectious diseases caused by viruses, bacteria, fungi, protozoa, and nematodes, epizootiology of insect diseases, and use of pathogens for control. Lab involves a diversity of pathogens and hosts, using techniques such as microinjection, electrophoresis, immunosassay, density gradient centrifugation, soil extraction, and computer simulation.

ENTOM 4700 Ecological Genetics (also BIOEE 4700)
Spring. 3 credits. Prerequisites: BIOEE 2780 or permission of instructor. S-U or letter grades. 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. Draws examples from primary research on animals and plants to illustrate experimental techniques and methods of data analysis on single-gene, multi-locus and genome-wide scales.

**ENTOM 4830 Insect Physiology**
Spring. 4 credits. Prerequisite: ENTOY 2120 or permission of instructor. Lec. lab. 600. Offered alternate years. C. Gilbert and A. Douglas.
Introduction to the unique ways in which insects have met their basic needs. Introduction to the often unique ways in which insects have met their basic needs. 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; next offered 2009–2010. 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 authorized by the department before the semester starts. Courses offered under the number will be approved by the department curriculum committee, and the course is not to be 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 assistant 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. Credit TBA. S-U or letter grades. Staff.
Prerequisite: permission of instructor. Students must register using an Independent Study Form (available in 140 Roberts Hall).

**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 biometrics 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. J. K. Liebherr.
This seminar will expose you to the rules of zoological nomenclature supported by the International Trust for Zoological Nomenclature. These rules will be viewed in the context of necessary principles for any system that concerns names of biological entities. The class benefits from our outstanding Comstock Memorial Library, from which we will view examples of important entomological works to gain an understanding of how the International Code for Zoological Nomenclature has been implemented.

**ENTOM 6620 Insect Behavior Seminar**
Spring. 2 credits. Prerequisites: permission of instructor or ENTOY 2120 and BION 2210 or equivalents. S-U or letter grades. Offered alternate years; next offered 2009–2010. C. Gilbert.

**ENTOM 6700 Seminar on Biological Control**
Fall. 1 credit. Prerequisite: ENTOY 2770, 4400, or 4630 or permission of instructor. S-U or letter grades. Offered alternate years. A. E. Hajek.
Upper-level seminar series in biological control covering topics chosen by participating students and faculty. Weekly discussion groups with each participant presenting at least one oral report based on independent reading or research focusing on a central theme for the semester.

**ENTOM 6850 Seminar in Insect Physiology**
Spring. 1 credit. Prerequisite: permission of instructor. S-U or letter grades. Offered alternate years; next offered 2009–2010. C. Gilbert.

**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. A. Hajek and B. N. Danforth.
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 on Monday as well as a one-hour meeting shortly after the seminar either 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 ENTOY 9900 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 ENTOY 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 undergraduate and graduate students. All interested undergraduate and graduate students are encouraged to attend.

**FOOD SCIENCE**

**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.

**FDSC 1102 Leadership and Career Skills in Food Science**
Spring 1 credit. Prerequisite: limited to freshman Food Science majors only. S-U 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 utilizing the Food Science Alumni Career Link network.
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 or 3 credits; lec only—2 credits; lec plus lab—3 credits; lab cannot be taken without lec. Letter grades only. D. E. Shaw. Introduction to meat science through a study of the structure, composition, and function of muscle and its conversion to meat. Also studies properties of fresh and processed meat, microbiology, preservations, nutritive value, inspection, and sanitation. Lab exercises include anatomy, meat-animal slaughter, meat cutting, wholesale and retail cut identification, processing, inspection, grading, quality control, and meat merchandising. An all-day field trip to commercial meat plants may be taken.

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
Fall. 3 credits. Limited to 30 students. Prerequisite: introductory microbiology or permission of instructor. Letter grades only. R. Mira de Orduña. 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
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. R. Mira de Orduña. 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 sensory 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 Laboratory (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. Reviews issues related to the biochemistry, genetics, and physiology of microorganisms important in these processes. 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. 2 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. Prerequisites: Microbiology of foods. Provides information on procedures to control biological, chemical, and physical hazards and assure the safety of foods. Topics include discussions on the hazards in foods, good manufacturing practices, prerequisite programs, Hazard Analysis Critical Control Point (HACCP) concept, and the application of current technologies in reducing the risk of foodborne illnesses. Uses case studies and class projects to demonstrate and apply the key principles discussed.

FDSC 4000 Current Topics in Food Science and Technology
Spring. 1 credit. S-U grades only. J. H. Hotchkiss. Discussion of current topics in food science. Topics vary and are chosen from scientific literature and popular press.

FDSC 4010 Concepts of Product Development
Spring. 2 credits. Prerequisite: FDSC 2000 or equivalent. Letter grades only. Offered alternate years. R. B. Gravani. Discussion of the sequence of events in developing and marketing new food products. Topics include food formulation, packaging and labeling, food additive and ingredient regulations, taste panels, market testing, market research, and patents.

FDSC 4020 Agriculture in Developing Nations I (also IARD 4020)
Fall. 2 credits. T. L. Tuck and R. W. Blake (Mexico sec); K. V. Raman and W. R. Coffman (India sec). Acquaints students with the major issues and problems in international agriculture and rural development and demonstrates how problems in development are being addressed in the Gulf Region of Mexico and India. The lectures/discussions establish the global and regional contexts for sustainable agricultural development and focus on development challenges in Latin America and Asia through cases in southern Mexico and India. This course may be taken as a stand-alone survey course in international agriculture and rural development. However, it is primarily a

FDSC 1104 Wines and Vines (also HORT 1040)
Spring. 2 or 3 credits. Lec and lab required for undergraduate enology and viticulture students. Lec. (2 cr.) limited to 60 students; lab (1 cr.) limited to 30 students. Priority given to enology and viticulture students. Letter grades only. K. Arnink and I. Merwin. Introduction to the study of grape cultivation, fermentation biology, wine composition, and sensory perception. Topics include winemaking history, viticultural regions, current vineyard and winery practices, wine chemistry and microbiology, and sensory evaluation of wine flavors. Wines are used to illustrate the components and processes that determine wine sensory properties.

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. 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 2500 Kosher and Halal Food Regulations (D)
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

FDSC 3400 Food Nutrition and Science and Technology
Spring. 3 credits. Prerequisites: BIOMI 2900–2910. C. A. Batt. Provides information on procedures to control biological, chemical, and physical hazards and assure the safety of foods. Topics include discussions on the hazards in foods, good manufacturing practices, prerequisite programs, Hazard Analysis Critical Control Point (HACCP) concept, and the application of current technologies in reducing the risk of foodborne illnesses. Uses case studies and class projects to demonstrate and apply the key principles discussed.

FDSC 4010 Concepts of Product Development
Spring. 2 credits. Prerequisite: FDSC 2000 or equivalent. Letter grades only. Offered alternate years. J. H. Hotchkiss. Discussion of the sequence of events in developing and marketing new food products. Topics include food formulation, packaging and labeling, food additive and ingredient regulations, taste panels, market testing, market research, and patents.

FDSC 4020 Agriculture in Developing Nations I (also IARD 4020)
Fall. 2 credits. T. L. Tuck and R. W. Blake (Mexico sec); K. V. Raman and W. R. Coffman (India sec). Acquaints students with the major issues and problems in international agriculture and rural development and demonstrates how problems in development are being addressed in the Gulf Region of Mexico and India. The lectures/discussions establish the global and regional contexts for sustainable agricultural development and focus on development challenges in Latin America and Asia through cases in southern Mexico and India. 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 concurrent field trips to the Gulf Region of Mexico and India during the January intersession.

FDSC 4050 Managing Food Waste Without Trashing the Environment
Spring. 3 credits. Prerequisite: FDSC 2000 or equivalent. Letter grades only. Lab, lecture. Offered alternate years. J. M. Regenstein.
Examines the various waste streams generated by food plants, institutional feeders, supermarkets, and restaurants. What is the role of waste minimization? What technologies can control or remediate the problems? What are the disposal, composting, and recycling options? What are the legal requirements locally, state-wide, and nationally that affect various food waste processes? This course serves as a general introduction to available waste management technologies and to policy issues faced by a wide range of businesses and production plants.

FDSC 4060 Dairy and Food Fermentations
Fall. 2 credits. Prerequisite: BIOM 2900. Letter grades only. M. Wiedmann.
Lectures cover 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. Lect 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 determine 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 separation 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 BIOM 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 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
Spring. 2 credits. Prerequisites: BIOM 3500 or 3510 or CHEM 1570 or equivalent. Corequisite: FDSC 4170. D. D. Miller.
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, 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 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 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
Spring. 3 credits. Prerequisites: introductory biology and chemistry or permission of instructor; age 21 by first day of class (Jan. 21, 2009). Letter grades only. T. E. Acree and K. J. Siebert.
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
Spring. 3 credits. Limited to 30 students. Recommended: prior course in enology and/or viticulture. 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. Course is limited to 30 students, with preference given to students in the enology or viticulture program.

FDSC 4500 Fundamentals of Food Law
Spring. 2 credits. Letter grades only. Offered alternate years; next offered 2009–2010. J. M. Regenstein.

FDSC 4560 Advanced Concepts in Sensory Evaluation
Spring. 2 credits. Prerequisite: FDSC 4100. S-U or letter grades. Offered alternate years. H. T. Lawless.
Readings and discussions of primary source materials in sensory evaluation, including recent advances in sensory methods, historical perspectives, psychophysics, perceptual biases, and multivariate statistical approaches to sensory data. Students conduct a research project or term paper on a current issue 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 MPS 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 4940 Special Topics in Food Science
Fall or spring. 4 credits max. S-U or letter grades. Staff.
This course is intended primarily for MPS students in the Field of Food Science and Technology enrolled in the dual Cornell-TNAU MPS 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 4990 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 5000 Seminar in Food Science
Fall and spring. 1 credit. S-U grades only. Requirement for all graduate students in field of food science and technology; highly recommended for graduate students majoring in food science and technology. 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 research seminar research.

FDSC 5160 Flavors—Analysis and Applications
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, volatile, 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 5220 Nutraceuticals and Functional Foods
Spring, Fall, or spring. 4 credits max. S-U or letter grades. Staff. Consider the chemistry of carbohydrates, including sugars, starches, pectins, hemicelluloses, gums, and other complex carbohydrates. Emphasizes the intrinsic chemistry and functionality in food systems and the changes occurring during food processing and storage.

FDSC 5300 Master of Professional Studies (Agriculture) Project
Fall, spring, summer. 1–6 credits. Requirement for MPS 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 5400 Chemistry of Dairy Products
Spring, fall, or spring. 4 credits max. S-U grades only. Prerequisites: introductory organic and biochemistry, food chemistry, and dairy biochemistry course equivalent to BIOBM 3300 or equivalent. Offered alternate years; next offered 2009–2010. B. A. Lewis and J. W. Brady. Surveys taste, aroma, 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 5421 Food Lipids
Spring, fall, or spring. 2 credits. Prerequisite: basic biochemistry course. Letter grades only. Offered alternate years; next offered 2009–2010. R. H. Liu. Describes the physical, chemical, biochemical, and functional properties of lipids. Emphasizes lipid oxidation, emissions, and functional foods associated with lipids.

FDSC 5422 Nutraceuticals and Functional Foods
Spring, fall, or spring. 2 credits. Prerequisite: biochemistry course equivalent to BIOBM 3300 and one year college biology or permission of instructor. Letter grades only. Offered alternate years. R. H. Liu. Covers nutraceuticals and functional foods, natural bioactive compounds, antioxidants, and dietary supplements, botanicals and herbs in disease prevention and health promotion. Emphasizes the mechanisms of action and scientific evidence of efficacy of nutraceuticals and functional foods. Also discusses biomarkers, safety and efficacy testing, and regulations for nutraceuticals and functional foods.

FDSC 5500 Advanced Food Microbiology
Spring, fall, or spring. 2 credits. Prerequisite: BIOM 2900, FDSC 3940. Letter grades only. Offered alternate years; next offered 2009–2010. 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, 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 5600 Chemometric Methods in Food Science
Fall. 2 credits. Prerequisites: basic statistics and chemistry course or permission of instructor. S-U or letter grades. Offered alternate years. K. J. Siebert. Food science applications using multivariate statistical methods (chemometrics) include extracting information from large data sets, modeling molecular and product properties, optimizing analytical methods and processing operations, discerning relationships between product composition and sensory properties, identifying cultivars or species, and detecting adulteration. The techniques covered are also applicable to many other problems in biology and chemistry.

FDSC 5950 Food Science Internship
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 496 internship courses must adhere to the CALS guidelines at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

FDSC 5970 Individual Study in Food Science
Fall or spring. 5 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 6000 Seminar in Food Science
Fall and spring. 1 credit. S-U grades only. Requirement for all graduate students in field of food science and technology; highly recommended for graduate students majoring in food science and technology. 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 research seminar research.

FDSC 6020 Agriculture in Developing Nations II (also NS 6200)
Spring, fall, or spring. 2 credits. Limited to 16 students. Prerequisites: introductory organic and biochemistry, food chemistry, and dairy biochemistry course or permission of instructor. Letter grades only. Offered alternate years. D. M. Barbano.

FDSC 6040 Chemistry of Dairy Products
Fall. 2 credits. Limited to 16 students. Prerequisites: introductory organic and biochemistry, food chemistry, and dairy biochemistry course or permission of instructor. Letter grades only. Offered alternate years. D. M. Barbano.

FDSC 6060 Agriculture in Developing Nations III (also NS 6200)
Spring, field trips to Gulf Region of Mexico (sec 1) and India (sec 2) during Jan. intersession. 3 credits. Prerequisites: IARD 4020 and (or) permission of instructors. Cost of field study trip (including airfare, local transportation, and lodging; some merit and need based financial aid may be available): approx. $2,500. R. W. Blake, T. W. Tucker, and C. F. Nicholson (Mexico); K. V. Ramasubbu, S. Ramakrishnan (India). For description, see IARD 6020.

FDSC 6080 Chemometric Methods in Food Science
Fall. 2 credits. Prerequisite: basic statistics and chemistry course or permission of instructor. S-U or letter grades. Staff. Uses multivariate statistical methods (chemometrics) to provide the analytical techniques needed to solve problems in the food sciences. The course covers model design, data acquisition and cleansing, exploratory data analysis, regression, principal components analysis, discriminant analysis, clustering, and other multivariate methods. A computer laboratory component allows the student to apply the methods on a variety of problems in food science and technology. The course is particularly applicable to many other problems in biology and chemistry.

FDSC 6160 Flavors—Analysis and Applications
Spring. 2 credits. S-U or letter grades. Offered alternate years; next offered 2009–2010. 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, volatile, 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 6200 Food Carbohydrates (also NS 6200)
Spring. 2 credits. Prerequisite: qualified seniors and graduate students, BIOBM 3300 or equivalent. Offered alternate years; next offered 2009–2010. B. A. Lewis and J. W. Brady.

FDSC 6220 Food Carbohydrates (also NS 6200)
Spring. 2 credits. Prerequisite: qualified seniors and graduate students, BIOBM 3300 or equivalent. Offered alternate years; next offered 2009–2010. B. A. Lewis and J. W. Brady.

FDSC 6300 Microbiology

FDSC 6320 Nutraceuticals and Functional Foods
Spring. 2 credits. Prerequisite: biochemistry course equivalent to BIOBM 3300 and one year college biology or permission of instructor. Letter grades only. Offered alternate years. R. H. Liu. Covers nutraceuticals and functional foods, natural bioactive compounds, antioxidants, and dietary supplements, botanicals and herbs in disease prevention and health promotion. Emphasizes the mechanisms of action and scientific evidence of efficacy of nutraceuticals and functional foods. Also discusses biomarkers, safety and efficacy testing, and regulations for nutraceuticals and functional foods.
On-the-job learning experience 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 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

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.

FDSC 6940 Food Polymer Science: Principles and Applications
Spring. 2 credits. Prerequisites: introductory chemistry and physics. Offered alternate years; next offered 2009–2010. 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
Spring. 2 credits. Prerequisite: FDSC 4230. Letter grades only. Lect. disc. Offered alternate years. S. H. Rizvi, S. J. Mulvaney, and C. I. Morano. Fundamental and quantitative analyses of current and emerging techniques used in the processing of foods and related biological materials. Topics include thermal processes, extrusion, supercritical fluids processing, membrane separation, high-pressure processing, pulsed electric field processing, ultraviolet and pulsed light treatment.

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 696 internship courses must adhere to the CALS guidelines at www.cals.cornell.edu/cals/current/student-research/internship/index.cfm.

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 9900 Doctoral-Level Thesis Research
Fall or spring. Credit TBA; max. 12. Prerequisite: doctoral students who have passed "A" exam; permission of Special Committee chair. S-U grades only. Graduate faculty.

HORT 1104 Introduction to Wines and Vines (also FDSC 1104)
Spring. 2 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 1105)
Spring. 1 credit. K. J. Arnink and I. A. Merwin. For description, see FDSC 1105.

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. Experimental course survey, 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 Landscapes
Fall. 2–3 credits; 1 additional credit for student projects permission by instructor. Offered odd-numbered years; next offered 2009–2010. 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.

HORT 2350 Plants and Human Well-Being (CA) (HA)

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 BIOL 2430)**
Fall. 4 credits. Prerequisite: one year introductory biology or written permission of instructor. May not be taken for credit after BIOL 2480. Offered every even-numbered years. M. A. Luckow.
For description, see BIOL 2430.

**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 101 and any other horticulture course; junior standing preferred. Letter grades only. W. B. Miller.
Course covers basics of establishing a greenhouse operation, growing crops in optimized environments and serving niche or mass market. Discusses technology basics including structures and equipment, systems for heating and cooling, lighting, irrigating and fertilizing, materials handling; environmental stewardship and integrated pest management; and production management. Also covers world centers of greenhouse crop production; culture of cut, pot, bedding, vegetable, and fruit crops in greenhouses, emphasizing successful harvesting through environmental, physical, and chemical management of growth and development. Each student grows one or more crops.

**HORT 3170 Seed Science and Technology (also CSS 3170)**
Fall. 3 credits. Prerequisite: BIOL 2410 or equivalent course approved by instructor. Letter grades only. Offered odd-numbered years. A. G. Taylor, Geneva Experiment Station.
Study of the principles and practices involved in seed production, conditioning, storage, quality management, seed enhancements, and stand establishment. Hands-on laboratory experience.

**HORT 3300 Golf and Sports Turf Management I**
Spring. 3 credits. Prerequisite: CSS 2600 or permission of instructor. Letter grades only. F. S. Rossi and A. M. Petrovic.
Proposal, site, specification, installation, establishment, and management of turfgrass areas. Emphasizes commercial locations including lawns, sports fields, and golf courses. Case study projects are a major aspect of the course.

**HORT 3400 Golf and Sports Turf Management Techniques**
Fall. 2 credits. Prerequisite: HORT 3300. Letter grades only. 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 160 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: BIOL 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 4030)**
Fall. 3 credits. Letter grades only. E. D. Earle.
For description, see PLBR 4010.

**HORT 4040 Plant Tissue Culture Laboratory (also PLBR 4020)**
Fall. 1 credit. E. D. Earle.
For description, see PLBR 4020.

**HORT 4200 Nursery-Crop Production**
Fall. 3 credits. Prerequisite: HORT 4000 or permission of instructor. Cost of field trips: $75. Offered odd-numbered years; next offered 2009–2010. 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. 3 credits. Offered odd-numbered years; next offered 2009–2010. S. Gan.
Study of the biological processes controlling physical and chemical changes in harvested yet living horticultural crops or their parts.

**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-fruited 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. Whittow.
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, readings, 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. 5 credits. Offered even-numbered years. M. P. Pritts.
Study of the evolution, breeding history, and physiology of strawberries, raspberries, blackberries, and blueberries, and other minor small fruit crops and of cultural practices that influence productivity, fruit quality, and pest damage. Considers marketing and economics and discusses alternate production practices for both commercial and home gardeners. Frequent field trips enhance classroom activities.

**HORT 4430 Viticulture and Vineyard Management—I**
Fall. 3 credits. Prerequisites: BIOG 1101/1103, 1102/1104, BIOL 2410, CSS 2600, BIOL 2420/2421 or equivalents. Letter grades only. J. E. Vanden Heuvel, 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**
Spring. 3 credits. Pre- or corequisites: HORT 4430 and PLBR 2250 or equivalent. Letter grades only. J. E. Vanden Heuvel.
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 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; next offered 2009–2010. T. A. Merwin.

The ecology and technology of deciduous tree-fruit production. 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; next offered 2009–2010. 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. R. R. Bellinder and S. Reinert.

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. Term project required. Field trips to large scale conventional, small, diversified, and organic farms are planned in early semester.

HORT 4551–4555 Mineral Nutrition of Crops and Landscape Plants (also CSS 4551–4555)
Spring. 5 modules, 1 credit each. Prerequisite: CSS 5600 and BIOPL 2420. Offered even-numbered years; next offered 2009–2010. Coordinator: H. C. Wien.

Students learn the principles of mineral nutrition 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 4550 Principles of Vegetable Production (also CSS 4551)
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; next offered 2009–2010. 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.

HORT 4620 Physiology of Vegetables and Flowers
Spring. 4 credits. Prerequisite: BIOPL 2420 or equivalent. Offered odd-numbered years. H. C. Wien.

Study of the physiological principles that govern growth, development, and production of reproductive structures of vegetable crops and herbaceous plants. Emphasizes processes of flower induction, fruit and seed set, and the balance of vegetative and reproductive growth, especially in perennials. Practical hands-on greenhouse experiments and small group discussions illustrate the lecture material.

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. 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 Plant 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; next offered 2009–2010. 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.

HORT 4900 Golf and Sports Turf Management II
Spring. 2 credits. Prerequisite: HORT 3500. 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 focuses 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.
horticulture, 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). Individual study in horticultural sciences under the direction of one or more faculty members. Staff.

**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). 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 5000 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. L. J. Bushway. An extension/outreach training course for graduate entomology, and horticulture students. Learn the skills to effectively develop the knowledge of adult volunteers in garden-based learning programs. With guidance, develop and pilot a volunteer training session on an introductory horticultural science topic appropriate to your interest and experience.

**HORT 6110 Field Experience in Extension Volunteer Development in Garden-based Learning**
Spring. 1 credit. Prerequisite: HORT 6100. L. J. Bushway. Lead introductory horticulture science training sessions for Master Gardener Volunteers and/or other volunteer groups associated with garden-based learning programming. Performance reflection discussions with peers and instructor will follow each volunteer training session to facilitate further skill development. Travel to multiple Cornell Cooperative Extension county offices throughout the state is required.

**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. 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. Discusses suitability of various procedures for measuring important plant and soil components. Analytical techniques are chosen from: ICP spectroscopy, elemental analysis by combustion or flow analysis, gas chromatography, HPLC, electrophoresis, electrochemical assays, enzyme assays, bioassays, and mass spectrometry.

**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). D. C. Roberts. 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. E. 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 6400 New Directions in Public Horticulture**
Spring. 1 credit. Offered odd-numbered years. D. A. Rakow and S. M. Skelly. Designed to introduce students to a range of current issues facing public gardens through a set of required readings. Each class period is devoted to a discussion of the topic between the instructors and students based on both the readings and personal experiences.

**HORT 6450 Advanced Viticultural Topics**
Spring. 2 credits. Prerequisite: HORT 4430 or equivalent. Letter grades only. Offered even-numbered years; next offered 2009–2010. A. N. Lakso and T. R. Bates. In-depth lecture/discussion of complex topics of viticulture, which 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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites and Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HORT 7000</td>
<td>Graduate Teaching Experience</td>
<td>Fall or spring. Variable credit. Prerequisite: permission of instructor; graduate standing. Undergraduates should enroll in HORT 4980 S-U grades only. 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.</td>
</tr>
<tr>
<td>HORT 8900</td>
<td>Thesis Research, Master of Science</td>
<td>Fall or spring. Variable credit. S-U grades only.</td>
</tr>
<tr>
<td>HORT 9900</td>
<td>Thesis Research, Doctor of Philosophy</td>
<td>Fall or spring. Variable credit. S-U grades only.</td>
</tr>
</tbody>
</table>

| INFORMATION SCIENCE | |
|--------------------| |
| INFO 1301 Introduction to Programming Web Applications | Fall, weeks 1–7. 2 credits. Students must enroll in both INFO 1301 and 1302. For description, see INFO 1301 in CIS section. |
| INFO 1302 Introduction to Designing Web Applications | Fall, weeks 8–14. 2 credits. Students must enroll in both INFO 1301 and 1302. Prerequisite: successful completion of INFO 1301. For description, see INFO 1302 in CIS section. |
| INFO 1700 Computation, Information, and Intelligence (also COGST 1720, CS/ENGRG 1700) | |
| INFO 2040 Networks (also CS 2850, ECON 2040, SOC 2120) (SBA) | Spring. 4 credits. For description, see ECON 2040. |
| INFO 2140 Cognitive Psychology (also COGST/PYCH 2140) (KCM) | Fall. 4 credits. Limited to 175 students. Prerequisite: sophomores. 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 1301 and 1302 strongly recommended. For description, see INFO 2300 in CIS section. |
| INFO 2310 Topics in Web Programming and Design | Fall, weeks 1–10. 1 credit. Prerequisite: INFO 2300. For description, see INFO 2310 in CIS section. |
| INFO 2450 Psychology of Social Computing (also COMM 2450) (SBA) | Fall, summer. 3 credits. For description, see COMM 2450. |
| INFO 2921 Inventing an Information Society (also AMST/EC/E/ENGRI 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 or equivalent. For description, see INFO 3300 in CIS section. |
| INFO 3450 Human-Computer Interaction Design (also COMM 3450) (SBA) | Spring. 3 credits. For description, see COMM 3450. |
| INFO 3490 Media Technologies (also COMM 3490, STS 3491) (CA) | Spring. 3 credits. Offered odd-numbered years. 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. For description, see STS 3561. |
| INFO 3650 Technology in Collaboration (also COMM 3650) (SBA) | Spring. 3 credits. Prerequisite: COMM/INFO 245. For description, see COMM 3650. |
| INFO 3660 History and Theory of Digital Art (also ARTH 3660) (CA) | Fall. 4 credits. Next offered 2009–2010. For description, see ARTH 3660. |
| INFO 3720 Explorations in Artificial Intelligence (also CS 3720) | Spring. 3 credits. Prerequisites: MATH 1110 or equivalent, information science approved statistics course, and CS 2110 or permission of instructor. Next offered 2009–2010. For description, see INFO 3720 in CIS section. |
| INFO 3871 The Automatic Lifestyle: Consumer Culture and Technology (also STS 3871) | |
| 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/ENGRG 2110 or equivalent. For description, see INFO 4302 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) | Spring. 3 credits. Prerequisites: background in computing, data structures, and programming at level of CS 2110 or equivalent; experience in using information systems. For description, see INFO 4350 in CIS section. |
| INFO 4400 Advanced Human-Computer Interaction Design (also COMM 4400) (SBA) | Fall. 3 credits. Prerequisite: COMM/INFO 2450. For description, see COMM 4400. |
| INFO 4414 Responsive Environments (also ARTH 4414) (CA) | Spring. 4 credits. Next offered 2009–2010. For description, see ARTH 4414. |
| INFO 4450 Seminar in Computer-Mediated Communication (also COMM 4450) (SBA) | Fall. 3 credits. Prerequisite: COMM 2450. Next offered 2009–2010. For description, see COMM 4450. |
| INFO 4470 Social and Economic Data (also LLRLE 4470) | Spring. 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. Next offered 2009–2010. For description, see COMM 4500. |
| INFO 4850 Computational Methods for Complex Networks | Spring. 3 credits. Prerequisites: ECON/INFO 2040/SOC 2090/CS 2950 or equivalent knowledge; CS 2110 or INFO 2300 or equivalent knowledge of basic programming. For description, see INFO 4850 in CIS section. |
| INFO 4950 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
Fall. 4 credits.
For description, see INFO 5150 in CIS section.

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 6002 Critical Technical Practices
INFO 6140 Cognitive Psychology (also COGST/PSYCH 6140)
Fall. 4 credits.
For description, see PSYCH 6140.

INFO 6144 Responsive Environments (also ARTH 6144)
For description, see ARTH 6144.

INFO 6300 Advanced Language Technologies (also CS 6740)
Fall or spring. In 2008–2009, offered in fall. 3 credits. Prerequisite: permission of instructor. Neither INFO/CS 4300 nor CS 4740 are prerequisites.
For description, see CS 6740 in CIS section.

INFO 6350 Seminar on Applications of Information Science (also INFO 4350)
Spring. 3 credits. Prerequisites: background in computing, data structures, and programming at level of CS 2110 or equivalent, and experience in using information systems. Undergraduates and master's students should enroll in INFO 4350; Ph.D. students should enroll in INFO 6350.
For description, see INFO 6350 in CIS section.

INFO 6400 Human-Computer Interaction Design (also COMM 6400)
Fall. 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. Next offered 2009–2010.
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.
For description, see LING 6648.

INFO 6500 Language and Technology (also COMM 6500)
Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. Next offered 2009–2010.
For description, see COMM 6500.

INFO 6850 The Structure of Information Processing (also CS 6850)
Fall. 4 credits. Prerequisite: CS 4820.
For description, see INFO 6850 in CIS section.

INFO 7090 IS Colloquium
Fall, spring. 1 credit. For staff, visitors, and graduate students interested in information science.

INFO 7470 Social and Economic Data (GR-RDC) (also ILRLE 7400)
Spring. 4 credits. Limited to Ph.D. and research master's students.
For description, see INFO 7470 in CIS section.

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. R. Blake and T. Tucker.
Acquaint 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 Agriculture in the Developing Nations II (IARD 4020), which includes a field trip to Asia 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/BIOL 4040)
Spring. 2 credits. Prerequisite: BIOGD 2810 or PLRB 2250 or permission of instructor. S-U or letter grades.
S. Kresovich.
For description, see PLRB 4040.

IARD 4050 Patents, Plants, and Profits: Intellectual Property Management for Scientists and Entrepreneurs (also PLBR 4050)
Spring. 2 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 4910 Food, Farming, and Personal Belief (also CSS 4910)
Spring. 1 credit. Prerequisite: 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.
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 (also LATA 4960)
Fall, spring. 1–6 credits. Prerequisite: submission of approved internship form (see CALS internship policy guidelines). S-U or letter grades.
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
(Also LATA 4970)
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 requirements. 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. R. Blake and T. Tucker. Designed to provide undergraduate 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 3620).

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 experiences 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 5850)
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 NTR/ES/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 work on 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 low-income 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 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 bases and to enhance their capacity to critically analyze their own problems, to conduct their own research, and to empower them to take direct action to solve those problems.

LANDSCAPE ARCHITECTURE

LA 1410 Grounding in Landscape Architecture
Fall. 4 credits. Limited to 15 students. Letter grades only. Fee for required drafting equipment plus materials for projects: approx. $250. 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 changing landscape.

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 land use 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.

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 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 2520 Daily Life and Cultural Landscapes (CA)
Fall. 3 credits. J. Zorn.
Surveys the common and not-so-common daily activities of the world of ancient Israel and its neighbors—Mesopotamia, Egypt, and Canaan. Many courses cover aspects of ancient political history or ancient literature, but these often focus on the activities of members of social elites, at the expense of the activities of more average citizens. The focus of this course on ancient technologies provides a broader spectrum, spanning all social classes. Material to be covered includes topics such as food production and processing, pottery production, metallurgy, glass making, cloth production and personal adornment, implements of war, medicine, leisure time (games and music), and others.

LA 2610 Fieldwork in Urban Archaeology (also CRP/ARKEO 2610) (CA) (LA)
Fall. 3 credits. Three 8-hr. Sat. field labs required; students choose three Sat. from seven offered. S. Baugher.
Urban archaeologists study American Indian, colonial, and 19th-century sites that now lie within the boundaries of modern cities. This course explores how urban centers evolve; what lies beneath today’s cities; and how various cultures have altered the urban landscape. Students participate in a local archaeological excavation.

LA 2620 Laboratory in Landscape Archaeology (also ARKEO 2620)
Spring. 3 credits. Required: LA 2610 or ARKEO 2610 or permission of instructor. S. Baugher.
Various American Indian civilizations and European cultures have altered the landscape to meet the needs of their cultures. Students learn how to interpret the American Indian and Euro-American landscapes of specific archaeological sites by identifying and dating artifacts, studying soil samples, and creating site maps.

LA 2660 Jerusalem through the Ages (also NES/JWST/ARKEO/RELST 2660) (CA) (LA)
Fall. 3 credits. Next offered 2009–2010. J. Zorn.
Explores the history, archaeology, and natural topography of Jerusalem throughout its long life, from its earliest remains in the Chalcolithic period (ca. 4000 B.C.E.) to the 19th century, including Jebusite Jerusalem, Jerusalem as the capital of the Davidic dynasty, the Roman era city of Herod and Jesus, the Crusaders and medieval Jerusalem, and Ottoman Jerusalem as the city entered the modern era. Students examine the original historical sources (e.g., Bible, Josephus, and the Madeba map) that pertain to Jerusalem.

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 restoration, sustainable design, and landscape representation through projects that derive form from a specific site and place.

LA 3020 Integrating Theory and Practice
Spring. 5 credits. Supplies and fees: approx. $250; field trip: approx. $250. 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 relationships to site design and planning are critically explored through theory and practice.

LA 3160 Site Engineering II
Fall. 2 credits. Prerequisite: LA 3150 or permission of instructor. M. Adleman.
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)
Spring. 3 credits. S. Baugher.
Various American Indian civilizations as well as diverse European cultures have all exerted their influences on the organization of town and city living. The course considers how each culture has altered the landscape in its own unique way as it created its own built environments.

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 a clear 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 amelioration 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 491. 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 and surface detailing, and planting techniques. Students critically assess potential planting sites; select appropriate trees, shrubs, vines and ground covers for a given site. Designs for specific sites are followed by written specifications, and graphic details 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 491 and 492 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 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, 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.

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 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 observation.

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 representation and graphic techniques. Projects focus on design applied to the practice of landscape architecture: particularly the relationship between measurement, process, experience, and form at multiple scales of observation.

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 depicted on the Severan Marble plan of Rome. Opportunity for a spring break trip to Rome.

LA 5520 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, exploratory 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
Fall. 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 5980 Graduate Teaching
Fall or spring. 1–5 credits. Prerequisite: permission of instructor. Students must register using independent study form (available in 140 Roberts Hall). 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 II
Fall. 2 credits. Prerequisite: LA 6150 or permission of instructor. M. Adlemann. Lectures and studio projects dealing with earthwork, stormwater 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)(D)
Spring. 5 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, and cultural landscape investigations. 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 town-planning techniques to specific contemporary problems of city environments. The studio investigates issues of urbanism and applies them to physical design interventions and spatial typologies involving the street, square, block, garden, and park systems. 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 relationships 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 land use and design methods. Students learn 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 8000 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

NTRES 1101 Intro to the Science and Management of Environmental and Natural Resources (also SNES 1101)
Fall. 3 credits. Prerequisite: first-year students in Natural Resources, Science of Natural and Natural Systems, or other “environmental cluster” areas in CALS. J. Lassoie 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 stories and two books will be used as vehicles for illustrating environmental predicaments and to enable easy discussion of environmental principles which 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; BLOG 1101-1102 or equivalent. Cost of two required overnight weekend field trips: approx. $12. 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 explain 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 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 3050.

**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. Coop.

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**

Spring, 3 credits. Prerequisites: none. Recommended: NTRES 2100, BIOEE 2610, or equivalent. L. Rudstam and R. Jackson.

Covers basic principles of fish ecology at the individual, population, and community level, particularly as they relate to interactions between fish and their environment and the implications of human activities to these relationships. Emphasizes the application of ecological principles to the conservation and management of fisheries resources and aquatic habitats. Extensive use of current literature and case studies will provide context for principles covered.

**NTRES 3111 Fish Ecology Laboratory**

Spring, four field trips TBA. 1 credit. Pre- or corequisite: NTRES 3110. L. Rudstam and R. Jackson.

Four field trips are planned to provide hands-on experiences in fish ecology and management. They include: a one-weekday Great Lakes experience aboard the USGS Kahoe on Lake Ontario, a one-day Oneida Lake trip to a state-of-the-art fish hatchery during the walleye run, a one-day Oneida Lake weekend trip to the Cornell Biological Field Station experiencing fish collection techniques, and a two-hour trip to Cayuga Inlet to witness the run of rainbow trout and possibly lamprey eels. Activities include demonstrations of various fish sampling gears and sample analysis techniques. Each student is required to maintain a written journal describing activities and concepts learned from each field trip that will be turned in at the end of the semester.

**NTRES 3130 Biological Statistics I (also BTRY 3130)**

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. C. R. Smith.

A course for majors and non-majors, focusing on science-based bird conservation and management at the organism, population, community, and landscape levels. Current resource management issues relevant to birds are explored in the contexts of agricultural practices, habitat management, the design and management of natural preserves, endangered species management, global climate change, and the economic importance of bird study as an outdoor recreational activity.

**NTRES 3141 Conservation of Birds Laboratory**

Spring, summer. 1 credit. Corequisite: NTRES 3140. Offered alternate years. 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. Topics covered include the choice and effective use of field guides, binoculars, and other tools for bird identification; procedures for taking and organizing field notes; the relationships of birds to their habitats and to other birds; and methods and procedures for censusing and surveying the songbird population.

**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**

Spring. 3 credits. Limited to 22 students. Priority given to juniors and seniors. Field lab participation required; often involves strenuous walking in all weather conditions. Letter grades only. Offered alternate years; next offered 2009–2010. P. J. Smallidge.

Practical, field-oriented course emphasizing principles and practices of stewardship and multiple purpose management of small, nonindustrial, private forest land in the northeastern United States, including the production of maple syrup.
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 STS5/BIOC/DSG 3311) (SBA)
Spring. 3 credits. S. Wolf. Considers the question of environmental governance, defined as the assemblage of social institutions that regulate natural resource use and shape environmental outcomes. Participants explore the roles of public policy, market exchange, and collective action in resource (mis)management. Introduces theoretical concepts from a variety of social science perspectives to support case studies and student-led discussions. Comparative analysis of how governance is pursued in different countries, historical periods, and ecological contexts (forestry, endangered species, water quality) highlight scope for institutional innovation. Course details at www.dnr.cornell.edu/saw44/ntres3311.html.

NTRES 3320 Introduction to Ethics and Environment (KCM)
Fall. 3 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 morality; the objective nature of value judgments; and the subjective nature of nature.

NTRES 3330 Ways of Knowing: Indigenous 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 non-human 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 Conservation Biology: Concepts and Techniques
Fall. 3 credits. Limited to 30 students. Prerequisite: juniors, seniors, or graduate students. NTRES 3100 or equivalent. Recommended: NTRES 2100. E. G. Coocha and T. A. Gavin. Thorough analysis the ecological and quantitative dimensions for decision making in modern conservation biology and management. Emphasizes analysis of variation and maintenance of biological diversity, and focuses on principles and techniques, including demographic viability analysis of populations, genetic analysis, as well as aspects of the human dimensions of conservation biology.

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. P. J. Sullivan. Examines the dynamics of marine and freshwater fisheries resources with a view toward observation, analysis, and decision making within an inferential framework. Growing pressure on fisheries resources, habitat modification, and increased uncertainty about the nature of biological systems are at the center of many fisheries issues. Quantitative models are useful for integrating information needed by decision makers in addressing these issues. The course develops analytical methods to assess the dynamics and status of fisheries resources and then demonstrates how the information may be transformed into useful information for decision makers.

NTRES 4120 Wildlife Population Analysis: Techniques and Models
Spring. 3 credits; two-week intensive course (MTWR F a.m. lec, p.m. labs) in Jan. with follow-up meetings during spring semester. Prerequisites: NTRES 3100 (or equivalent or permission of instructor), college-level math or statistics course. Lec/ lab E. Coocha. 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. The course will focus on exploration of a selection of the tools needed for modern wildlife conservation and management, including (particularly) analysis of mark-recapture data, population viability analysis, community analysis, decision theory, and matrix modeling.

NTRES 4130 Biological Statistics II (also BTRY 3020)
Spring. 4 credits. Prerequisite: NTRES 3130 or BTRY 3010. Staff. 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, forest biogeography, 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 and Management—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. Considers current regulations, protection programs, and management strategies.

NTRES 4221 Wetland Ecology and Management—Laboratory
Fall. 4 credits. Prerequisites: NTRES 4220. One weekend 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 standing; one introductory and one advanced course in ecology or equivalents. Offered alternate years. B. L. Bedford. Presents ecological concepts and analytical tools needed to evaluate environmental impacts to natural resources and ecosystems within an integrated context that incorporates the landscapes in which these resources occur. Explores diverse conceptual frameworks for landscape impact analysis and exposes students to modern tools for evaluating landscapes.

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. Staff.
The course covers the theory and practice of solving wildlife-related resource issues. Differences between basic and applied wildlife science will be discussed. The application of basic science and the scientific method will be integrated into community/agency-based problem solving. Issues and approaches to management of terrestrial and wetland wildlife will be discussed with emphasis on technical, logistical, analytical, and communication skills.

NTRES 4300 Environmental and Natural Resources Policy Processes
Spring. 3 credits. Prerequisites: junior standing; special application process. Lect. Wash., D.C., during Jan. 11-day winter session; three-two-hour orientation sessions in fall semester and four two-hour sessions in Feb. and March. Fee: approx. $450. Completed applications due by Oct 1. 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 policymakers 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)
Spring. 3 credits. S. Wolf.
Research-oriented seminar focused on conservation of natural resources in the contemporary political and institutional environment. We study opportunities to mobilize market mechanisms and competitive strategies of firms to harmonize economic and environmental demands on ecological systems. Through production of a portfolio of analyses of real-world integrated environmental management schemes, students will come to understand the mechanics of this general class of environmental policy tools and develop a critique as to why the market does not represent a comprehensive approach to sustainability. Course details at www.dnr.cornell.edu/saw/4/ntres431.html.

[NTRES 4320 Human Dimensions of Natural Resource Management]

NTRES 4330 Applied Environmental Philosophy (KCM)
Spring. 3 credits. Recommended: NTRES 3520. J. Tantillo.
Special topic for 2009. 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. 3 credits. Letter grades only. J. Lassoie.
Lectures, readings, and multimedia information, including a new Internet-based platform linking students to conservation practitioners, builds a multidisciplinary understanding of the principles underpinning conservation and natural-resource management. Specific attention is given to the role of local communities in developing sustainable land-use strategies. Case studies from Africa, Latin America, Asia, and the United States examine particular conservation and management issues from widely different geopolitical perspectives. Stakeholder analyses are used to base discussions of each case, followed by a synthesis and discussion of key contrasts and comparisons centered on common themes identified during the course.

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. Limited to 40 students. Prerequisite: permission of instructor. S-U or letter grades. One Sat field trip. Offered alternate years; next offered 2009–2010. 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 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 4970 Individual Study in Environmental Social Science and Resource Policy
Individual study under faculty supervision. Topics in environmental social science and 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, 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.
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, function, and execution of course plans through application and discussions with instructor.

NTRES 4991 Honors Research in Natural Resources
Fall or spring. 2 credits. Prerequisite: beginning NTRES 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 faculty-led discussions of key natural resource issues, student discussions of research ideas, and skill building sessions on proposal writing and giving research presentations.

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. 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. Prerequisite: NTRES 3130 or permission of instructor. S-U or letter grades. Offered alternate years. E. Couch. 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
Spring. 3 credits. Prerequisites: NTRES 3100 or equivalent; permission of instructor. S-U or letter grades. Offered alternate years. Staff. For description, see NTRES 4280.

NTRES 6310 Environmental Governance (also DSOC 6320)
Spring. 4 credits. S. Wolf. For description, see NTRES 3510. Students taking the course for graduate credit are required to read supplemental materials, undertake more complex research assignments, and participate in seminar discussion section.

NTRES 6340 International Conservation: Communities and the Management of the World’s Natural Resources
Fall. 3 credits. Variable. Prerequisite: graduate standing. Letter grades only. Offered alternate odd-numbered years. J. P. Lassoe. For description, see NTRES 4340. Students taking the course for graduate credit will be required to identify and critically review additional literature and participate in a one-hour discussion seminar per week (TBA).

NTRES 6700 Spatial Statistics
Spring. 3 credits. Prerequisites: BTRY 6010 and BTRY 6020 or equivalent, or permission of instructor, is highly recommended: introductory GIS course. S-U or letter grades. Offered alternate years; next offered 2009–2010. 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 6840 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/SSC 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 7800 Graduate Seminar in Ornithology (also BIOEE 7800)
Fall or spring. 1 credit. S-U grades only. Undergraduates must have permission of instructor. J. Hansell, J. Lovette, A. Dohnt, 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 9000 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.

Environmental and Society (DSOC 2010, 3240, 3400, 4100)
Ecology and Biology (ENTOM 3440, 3700, 4550, 4700; BIOEE 2610, 2630, 2740, 2760, 3630, 4500, 4750, 4970, 4950, 4620, 4660, 4680, 4700, 4720, 4730, 4750, 4760, 4780; BIOM 2900–2920, 3970, 4180; BIOM 2210, 2220, 3210, 3270; BIOL 2410, 2470, 2480, 3420, 4480; CSS 4660, 4720; EAS 1540, 2200, 3010, 3030, 3500, 3510, 4400)
Environmental Law, Ethics, and Philosophy (STS 2061, CRP 3840, 4440, 4510, PHIL 2410, 2460, 3810)
Human Systems and Communication (COMM 2580, 3520, 4210, 4560, 4660; ENTOM 3550; CRP 3840)
Physical Sciences (BEE 1510, 2510, 3710, 4010, 4270, 4350, 4710, 4730, 4750, 4780; CSS 2600, 3650, 3720, 3970, 4110, 4200, 4210, 4830; EAS 1101, 1540, 2400, 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

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. P. Gregory. 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
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 other 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
Fall. 1 credit. Limited enrollment. Pre- or corequisite: PLBR 4010 or permission of instructor. 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 BIOL/ARD 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 molded the current diversity we conserve and use. Based on advances in systematics and molecular genetics, this course presents an integrated approach to understanding and describing diversity of agricultural and horticultural species. Also addresses underlying ethical, legal, and social issues affecting conservation and use.

PLBR 4050 Patents, Plants, and Profits: Intellectual Property Management for Scientists and Entrepreneurs (also IARD 4050)
Spring. 2 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 4050 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 improve the contents of micronutrients, vitamins, phyttochemicals, as well as the qualities of proteins and lipids via conventional breeding and transgenic approaches.

PLBR 4460 Plant Cytogenetics Laboratory
Spring, two-week module. 1 credit. S-U grades only. Prerequisite: genetics course or permission of instructor. Check with department for further information. K. N. Watanabe and 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 BIOL 4826)
Spring. 1 credit. Prerequisite: BIOL 4831 or permission of instructor. S-U or letter grades. 12 lec. E. D. Earle. Deals with 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 BIOPL/PLPA 4831)
Fall, eight weeks. 2 credits. Prerequisites: see BIOL 4830. S-U or letter grades. Two lec and one day of disc per week. S. McCouch, J. Giovanni, and J. Rose. For description, see BIOL 4831.

PLBR 4833 Plant Genome Organization (also BIOL 4833) Fall. 1 credit. Prerequisite: BIOL 4831. S-U or letter grades. Offered alternate years. S. D. Tanksley. For description, see BIOL 4833.

PLBR 4835 Molecular Breeding (also BIOL 4835)
Fall. 1 credit. S-U or letter grades. Offered alternate years; next offered 2009–2010. S. Tanksley. For description, see BIOL 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 this 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 or equivalent, 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. S-U or letter grades. Prerequisites: permission of instructor and previous enrollment in course to be taught or equivalent. 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)
Fall. 2 credits. Recommended: BIOGD 2810 and PLBR 4030 or equivalents; introductory course in plant pathology and/or entomology. Offered alternate even-numbered years. P. Griffiths.

Multidisciplinary examination of the challenge of incorporating disease and insect resistance into crop plants. Topics include importance of host plant resistance, national and international germplasm collections, germplasm evaluation and enhancement, population development, evaluating populations, resistance mechanisms in plants, genetic control of resistance, approaches to breeding for host plant resistance, stability of genetic resistance mechanisms, the use of marker-assisted selection and molecular tools in breeding for host plant resistance.

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
Spring. 3 credits. Prerequisite: PLBR 4050. S-U or letter grades. Offered alternate odd-numbered years. M. E. Sorrells.

Emphasizes critical discussion and evaluation of selected benchmark papers and current literature. Reviews and discusses conventional and molecular selection techniques and breeding objectives, methods, and strategies for both self- and cross-pollinated crops. Requires extensive outside reading. Grades are based on four papers demonstrating creative thinking and analysis of plant breeding concepts.

[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 determine correlation coefficients. During one period, plants in the greenhouse are evaluated to determine correlation coefficients.

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

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
Spring or fall. 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 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 3010 Biology and Management of Plant Diseases
Fall. 4 credits. Prerequisite: one year of biology. S-U or letter grades. M. G. Milgroom. 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 3390. 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 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 3201 Mushrooms, Molds, and Molecules
Spring. 1 credit. Pre- or corequisite: PLPA 2010. S-U grades only. B. G. Turgeon and G. W. Hudler. An extra-credit option for students who are registered for PLPA 2010 Magical Mushrooms. Misschou, a Mold, who would like to use that knowledge to get more in-depth exposure to some of the issues raised in lecture. Experts in the fungus world talk about their work, emphasizing the fact that fungi produce myriads of diverse molecules that affect their own development (e.g., germination, reproduction, pathogenicity) and also beneficial (e.g., antibiotics, immunosuppressants, stress-reducing), as well as detrimental (e.g., toxins, poisons, allergens, carcinogens), effects on organisms around them.

PLPA 3940 Circadian Rhythms (also ENTOM/BIOGD/BION 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, 3520, 4320. Letter grades only. G. R. Whittaker and S. G. Lazarowitz. 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? Assess 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 4200)
Fall. 3 credits. Prerequisite: PLPA 3010, ENTOM 2410, or permission of instructors. S-U or letter grades. W. Wilcox, G. English-Loeby, 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. Laboratory emphasis on field illustrations of classroom concepts. Team taught by a plant pathologist, entomologist, and agricultural engineer.

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. 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. Considered forest, shade, and ornamental plants.

PLPA 4480 Evolution and Ecology of Symbiotic Associations (also BIOMI 4480)
Spring. 2 credits. Prerequisites: BIOL 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 are going to focus on a selection of ecologically important symbiotic interactions, consider their evolutionary origins, and explore conditions that would favor their establishment and maintenance.

PLPA 4700 Professional Skills in Plant Science
Spring. 2 credits. S-U grades only. E. B. Nelson. Provides students who are aspiring to careers as research plant scientists with an overview of the art and science of the profession. Topics include (1) what it means to be a scientist and plant pathologist; (2) preparation required of graduate students in plant pathology programs; (3) ethical considerations important to plant pathologists; (4) how to seek funding to support research activities; (5) managing the scientific inquiry; (6) funneling curiosity into scientific inquiry; and (7) how to read a scientific paper. Students in related disciplines (e.g., horticulture, plant breeding, plant biology) also benefit from concepts presented in this course.

PLPA 4821–4822 Molecular Plant-Pathogen Interactions I and II (also BIOPL 4821–4822)
Spring, weeks 1–4. 1 credit. Prerequisites: BIOGD 2810, BIOBM 3300 or 3310, and BIOPL 4851. 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, and 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, and BIOPL 4851. S-U or letter grades. Offered even-numbered years; next offered 2009–2010. S. C. Winans. For description, see BIOPL 4823.]

PLPA 4831 Plant Molecular Biology I—Concepts and Techniques in Plant Molecular Biology (also BIOPL/PLBR 4831)
Fall, weeks 1–4. 2 credits. Prerequisites: BIOGD 2810, BIOBM 3300, or 3310. S-U or letter grades. J. J. Giovanni, S. M. McCormick, and J. Rose. For description, see BIOPL 4831.
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. Prerequisites: PLPA 3010 or equivalent. S-U or letter grades. 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. W. E. Fry and K. L. Perry. 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 6060 Molecular Plant Virology (also BIOMI 6060)
Spring, weeks 1–7. 1 credit. Prerequisites: BIOMI 4090 or equivalent or permission of instructor. S-U or letter grades. Offered odd-numbered years. S. G. Lazarowitz. Introduces students to the molecular biology of plant virus replication and interactions with the host to produce disease. Topics include virus replication strategies, cell-to-cell and systemic movement, host defense, responses and virus counterstrategies, and engineered resistance.

PLPA 6080 Genomics of Bacterium-Host Interactions (also BIOMI 6800)
Fall, weeks 2–5 (Sept. 1–26). 1 credit. Prerequisite: BIOMI 2900 or equivalent or permission of instructor. S-U or letter grades. Offered even-numbered years. 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 TIGRE Comprehensive Microbial Resource and Artemis tools, the legumes, Viridiplantae pests, V. enterococctica, Pseudomonas syringae, Ralstonia solanacearum, and Agrobacterium tumefaciens, and the symbiont Sinorhizobium meliloti.

PLPA 6380 Filamentous Fungal Genomics and Development (also BIODE 6380)
Spring, weeks 9–12. 1 credit. Prerequisite: BIODE 2810 or equivalent. S-U or letter grades. M. G. Milgroom. Topics include modern genomics and developmental 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 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 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 6680 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 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  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 9910  Doctoral-Level Thesis Research
Fall or spring. Credit TBA. S-U or letter grades. Prerequisites: permission of advisor. Graduate faculty. For Ph.D. candidates who have passed "A" exam.

SCIENCE OF NATURAL AND ENVIRONMENTAL SYSTEMS

SNES 1010  Intro to the Science and Management of Environmental and Natural Resources (also NTRES 1010)
Fall. 3 credits. Prerequisite: first-year students in Natural Resources. Science of Natural and Environmental Systems, or other "environmental cluster" areas in CALS. J. Lassoie and E. Madsen. For description, see NTRES 1010.

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, economical 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/current/student-research/internship/index.cfm.

FACULTY ROSTER
Ahari, George S., Ph.D., Cornell U. Prof., Plant Pathology and Plant-Microbe Biology (Geneva)
Acrec, Terry E., Ph.D., Cornell U. Prof., Food Science, and Technology (Geneva)
Agello, 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
Allbright, Louis D., Ph.D., Cornell U. Prof., Biological and Environmental Engineering
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
Baeummer, Antje J., Ph.D., U. of Stuttgart (Germany). Assoc. Prof., Biological and Environmental Engineering
Bain, Mark B., Ph.D., U. of Massachusetts. Assoc. Prof., Natural Resources
Bamburg, 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
Basa, Alaka, M.S., U. of London (UK). Prof., Development Sociology
Batt, Carl A., Ph.D., Rutgers U. Prof., Food Science
Baugh, Sherene, Ph.D., SUNY, Stonybrook. Assoc. Prof., Landscape Architecture
Bauman, Dale E., Ph.D., U. of Illinois. Prof., Animal Science
Beaver, 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
Bjorkman, Thomas N., Ph.D., Cornell U. Assoc. Prof., Horticultural Sciences (Geneva)
Blake, Robert W., Ph.D., North Carolina State U. Prof., Animal Science
Blalock, Garrick, Ph.D., U. of California. Prof., Applied Economics and Management
Blossey, Bernd, Ph.D., Christian-Albrechts U. (Germany). Assoc. Prof., Natural Resources
Boisclair, Yves R., Ph.D., Cornell U. Prof., Animal Science
Boor, Kathryn J., Ph.D., U. of California, Davis. Prof., Food Science
Booth, James D., 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, LIHER 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
Burk, Thomas J., Ph.D., U. of California, Berkeley. Prof., Plant Pathology and Plant-Microbe Biology (Geneva)
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)
D’Tommaso, John, 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
Eberts, Paul R., Ph.D., U. of Michigan. Prof., Development Sociology
Eleftherohorinou, Parfait M., Ph.D., Pennsylvania State U. Asst. Prof., Development Sociology
Fahey, Timothy J., Ph.D., U. of Wyoming. Prof., Natural Resources
Feldman, Shanni, Ph.D., U. of Connecticut. Prof., Development Sociology
Fick, Gary W., Ph.D., U. of California, Davis. Prof., Crop and Soil Sciences
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
Fuchs, Marc, Ph.D., U. Louis Pasteur (France). Asst. Prof., Entomology and Plant-Microbe Biology (Geneva)
Fusell, Susan R., Ph.D., Columbia U. Assoc. Prof., Communication
Galton, David M., Ph.D., Ohio State U. Prof., Animal Science
Gan, Susheng, Ph.D., U. of Wisconsin. Assoc. Prof., Horticulture
Gavalchin, Jerrie, Ph.D., Rutgers U. Assoc. Prof., Animal Science, Microbiology and Immunology
Gavin, Thomas A., Ph.D., Oregon State U. Assoc. Prof., Natural Resources
Gay, Geraldine K., Ph.D., Cornell U. Prof., Communication
Gebremedhin, Kifle G., Ph.D., U. of Wisconsin. Prof., Biological and Environmental Engineering
Geisler, Charles C., Ph.D., U. of Wisconsin. Prof., Development Sociology
Gellert, Paul K., Ph.D., U. of Wisconsin. Asst. Prof., Development Sociology
Gibert, 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
Gonzales, Angela M.A., Harvard U. Asst. Prof., Development Sociology
Gorewit, Ronald C., Ph.D., Michigan State U. Prof., Emeritus, Biological and Environmental Engineering
Gravani, Robert B., Ph.D., Cornell U. Prof., Food Science
Gray, Stewart M., Ph.D., North Carolina State U. Prof. Emeritus, Plant Pathology and Plant-Microbe Biology
Griffiths, Phillip D., Ph.D., U. of Florida. Assoc. Prof., Horticultural Sciences (Geneva)
Gurak, Douglas T., Ph.D., U. of Wisconsin. Prof., Development Sociology
Hahn, Russell R., Ph.D., Texas A&M U. Assoc. Prof., Crop and Soil Sciences
Haith, Douglas A., Ph.D., Cornell U. Prof., Biological and Environmental Engineering
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
Hare, Matthew P., Ph.D., U. of Georgia. Assoc. Prof., Natural Resources
Harman, Gary E., Ph.D., Oregon State U. Assoc. Prof., Horticultural Sciences (Geneva)
Harrington, Laura, Ph.D., U. of Massachusetts. Assoc. Prof., Entomology
Hess, Peter G., Ph.D., U. of Washington. Assoc. Prof., Biological and Environmental Engineering
Hirsch, 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
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
Hubanen, Pekka J., Ph.D., U. of Helsinki (Finland). Assoc. Prof., Animal Science
Hullar, Theodore L., Ph.D., U. of Minnesota. Prof., Natural Resources
Humphreys, Lee M., Ph.D., U. of Pennsylvania. Assoc. Prof., Communication
Hunter, Jean B., D.En.Sc., Columbia U. Assoc. Prof., Biological and Environmental Engineering
Irwin, Lynne H., Ph.D., Texas A&M U. Assoc. Prof., Biological and Environmental Engineering
Jahn, Margaret M., Ph.D., Cornell U. Prof., Plant Breeding
Jewell, William J., Ph.D., Stanford U. Prof., Emeritus, Biological and Environmental Engineering
Johnson, Patricia A., Ph.D., Cornell U. Prof., Animal Science
Kassam, Karim-Aly, Ph.D., Cornell U. Assoc. Prof., Natural Resources
Kettenring, Quinne, Ph.D., Ohio State. Assoc. Prof., Crop and Soil Sciences
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.

The college occupies Sibley Hall, Olive Tjaden Hall, Rand Hall, and the Foundry. Facilities for architecture and city and regional planning, as well as college administrative offices, the Visual Resources Facility, 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 and Sibley. 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 Visual Resources Facility, made possible through gifts from George and Adelaide Knight, is located in Sibley Hall and contains the F. M. Wells Memorial Slide Collection, which consists of a large and growing collection of slides of architecture, architectural history, and art. The collection now includes approximately 500,000 slides as well as a rapidly developing digital image collection.

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. The college has been hosting students in Italy for 20 years. From its beginnings, the program has provided a transformative experience for young, developing artists, architects, urbanists, and scholars. The program is open to Cornell juniors and seniors, as well as students from other colleges and universities.

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 European city, a semester in Rome has proven to be one of the most important experiences of the undergraduate years, for both intellectual and personal growth.
Courses are offered in architecture, art, and urban studies, architecture history, art history, drawing, photography, architecture theory, contemporary Italian culture, European politics, and Italian language. Weekly classes use the city and its wealth of museums and galleries, archaeological sites, villas, churches, and remarkable public spaces for on-site study, as well as Rome’s many neighborhoods, for field-based learning activities.

Cornell in Rome’s resident faculty, chosen from local and internationally known scholars, critics, architects, and artists, are all expert at using the city as an unparalleled resource for instruction and inspiration. They are joined by Cornell professors from each of the three departments in Ithaca, who teach in Rome for the entire term. An extensive field trip program to many different regions of Italy beyond Rome complements course offerings.

The program is based at Palazzo Lazzaroni, a seventeenth century building in the historic center of Rome and students live nearby in completely furnished apartments provided by the program, enjoying daily contact with the urban life of a major, European city.

Application is made in the academic year before participation. The deadline is November 1 for AAP students and December 15 for all out-of-college applicants. 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 in New York City
The College of Architecture, Art, and Planning’s newly opened 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, and to be exposed to professional expertise at design firms and nonprofit agencies throughout the city. Located near Union Square in the vibrant Chelsea neighborhood of Manhattan, the AAP center is home base for a semester-long immersive, urban experience. The AAP NYC curriculum reflects Manhattan’s extraordinary artistic, historical, and cultural resources and connects students with AAP’s extensive network of professionals who frequently teach courses and serve as guest critics.

In addition to innovative course work, architecture students may also elect to do a 16-hour-per-week internship at a Manhattan firm. Students in the Urban and Regional Studies (URS) program spend three and a half days a week working with senior executives from public, private, and non-profit organizations. The first group of BFA students will be in residence in New York in spring 2009, combining studio work with art history and theory courses that utilize the unparalleled art resources of New York City.

Eligibility
The program is available to fourth- and fifth-year Cornell undergraduates in the Department of Architecture, and is required for fifth semester M. Arch. 1 students, and third semester M. Arch. 2 students. Students in the program of URS must have completed two years of their required curriculum. Students in the Department of Art are eligible to attend the program in the second semester of their sophomore year. Undergraduate students from outside Cornell are encouraged to apply.

Application is made in the academic year prior to participation. The deadline is November 1 for AAP students and December 15 for all out-of-college applicants.

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.

Scholastic Standards
Semester by semester, a candidate for an undergraduate degree in this college is required to successfully complete a minimum of 12 credit hours with a grade point average for the semester of not less than 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 is not up to 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 dean, chair of the Academic Records Committee, 129 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 November 15 and requests for fall semester return must be made by April 15. 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 re-register 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. Personal leaves of absence may be granted for a variety of reasons. The student may request a personal 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 term 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. Conditional leaves of absence may be granted for students desiring to take a leave 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...
ARCHITECTURE COURSES
Course offerings in the college of Architecture, Art and Planning are listed under the various departments. Courses are identified with a standard abbreviation followed by a three-digit number.

For the entering class of 2008, all new students in the college of AAP will be required to complete a 1-credit, interdisciplinary course offered in the fall semester.

AAP 101 The World We Make
Fall and spring, 1 credit. S-U grades. Staff. This course offers AAP first-year students an introduction to the subjects, theories, and methodologies of the disciplines of art, planning, architecture, and landscape architecture. Examples drawn from a range of historical periods as well as contemporary practice highlight distinct processes of thinking and working in each discipline, as well as areas of intersection and overlap.

ARCHITECTURE

Professional Degree Programs
Cornell offers two professional degrees in architecture: the undergraduate bachelor of architecture and the graduate master of architecture. These degrees count toward the professional registration requirements established by the various states, the National Architectural Accrediting Board, and the National Council of Architectural Registration Boards.

B. Arch.
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, reading, writing, 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.

M. Arch. I
Cornell's graduate professional program is normally three and one-half years long and is intended for students who already have a bachelor's degree in any subject. Information on this professional graduate program may be found on the architecture web site (www.architecture.cornell.edu).

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 one-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards.

Master's degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree that, when earned sequentially, constitutes an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

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.

Cornell in Rome
The program offers the opportunity for students from Cornell and other universities to spend one or two semesters of study in Rome. This option is open to fourth- and fifth-year Cornell architecture students; outstanding third-year students are admitted by petition and a review of their design record. Courses offered by this department include design, history, theory, architectural science, and visual studies. In addition, courses are offered by other departments in Italian language, Italian culture, and regional planning and history of art. The program provides a unique urban and architectural experience drawing from the rich past of the city for sources of instruction and inspiration.

AAP in New York City
The goals of the Architecture Program in New York City are to introduce the students to the best of contemporary practice while enabling students to benefit from transdisciplinary activities achieved by collaboration with the students of other departments and exposure to a multiplicity of practices including art and engineering.
Students have the opportunity to establish connections with significant practices outside of the studio through internships.

**B.Arch. Curriculum**

### First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td>1101 Design I 6</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td>1102 Design II 6</td>
</tr>
</tbody>
</table>

### Second Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td>2101 Design III 6</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td>2102 Design IV 6</td>
</tr>
</tbody>
</table>

### Third Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td>3101 Design V 6</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td>3102 Design VI 6</td>
</tr>
</tbody>
</table>

### Fourth Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td>4101 Design VII 6</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td>4102 Design VIII 6</td>
</tr>
</tbody>
</table>

### Fifth Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td>5101 Design IX 6</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td>5901 Design X 8</td>
</tr>
</tbody>
</table>

### Required Departmental Courses

<table>
<thead>
<tr>
<th>Subject</th>
<th>Course Numbers</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1101–5901</td>
<td>62</td>
</tr>
<tr>
<td>1</td>
<td>MAT 1110, MAT 1106, or approved equivalent</td>
<td>3–4</td>
</tr>
<tr>
<td>3</td>
<td>2603, 2604, 3603</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>2301, 2302</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>1801, 1802</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>3402</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>5201</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>1501, 1502, 2503</td>
<td>6</td>
</tr>
</tbody>
</table>

### Electives

<table>
<thead>
<tr>
<th>Semesters</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3 history of architecture: 3000 level 9</td>
</tr>
<tr>
<td>1</td>
<td>1 visual representation in architecture 3</td>
</tr>
<tr>
<td>2</td>
<td>2 architectural theory or 6000-level design-related course 6</td>
</tr>
<tr>
<td>1</td>
<td>architectural structures, construction, or environmental systems and conservation 3</td>
</tr>
<tr>
<td>1</td>
<td>mathematics, or physical or biological sciences 3</td>
</tr>
<tr>
<td>1</td>
<td>humanities 3</td>
</tr>
</tbody>
</table>

### Third Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Free</td>
</tr>
<tr>
<td>3</td>
<td>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. One of these must be AAP 1101.</td>
</tr>
<tr>
<td>30</td>
<td>Total credits 176</td>
</tr>
</tbody>
</table>

### 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 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.

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 in another college 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. Advising 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 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 5901, 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 students considering a professional education in architecture.

Concentration in Architecture for Nonmajors
A special concentration 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 Concentration 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 concentration should complete a concentration form, which is available in the architecture department office. This form, when validated by the architecture department and the AAP college registrar, serves as evidence of completion of the concentration requirements. Students should consult their individual college registrars for information about whether their home college recognizes and notes such concentrations on transcripts or diplomas.

The curriculum for students in the Concentration 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

Mission Statement

Consistent with the broader mission of the Department of Architecture, the Master of Architecture program 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 & Analytical Drawing 3
ARCH 5301 Theories and Analyses of Architecture I  3
ARCH 5603 Structural Concepts 4
ARCH 5801 History of Architecture I  3

Total Units/Credit Hours 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

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

Total Units/Credit Hours 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

Total Units/Credit Hours 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

Total Units/Credit Hours 15

Term Six

ARCH 5116 Vertical Design Studio  6
Visual Representation Elective  3
Open Elective  3
History or Theory or Visual Representation Elective*  3

Total Units/Credit Hours 15

Term Seven

ARCH 8912 Independent Design Thesis 9
Open Elective  3

Total Units/Credit Hours 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

Architectural Design

Courses in brackets are not offered this year.

Each student in the architecture program (undergraduates, graduates, New York City Program, and Rome Program participants) is charged a fee each semester to help defray the continuing costs of furnishing and replacing equipment.

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 2101, ARCH 1101 and 1502, for 2102, ARCH 2101. Corequisite: ARCH 2501–2502. Staff.

ARCH 3101–3102 Design V and VI
Fall and spring, 6 credits each semester. Prerequisites: department students; for ARCH 3101, ARCH 2101; for 3102, ARCH 3101. Staff.

ARCH 4101–4102 Design VII and VIII
Fall and spring, 6 credits each semester. Prerequisite: department students; for ARCH 4101, ARCH 3101 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 5901 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 contemporary and 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. 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 5801 and 5802. 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
Fall, fall, 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 department office. Each student is assigned to a class of appropriate level. Staff. Nonsequence design used as temporary placement of transfer students, off-campus foreign programs third-year students (summer and Rome) and for incomplete in design sequence. In some cases student must petition to convert elective design into sequence design.

ARCH 5103 Design IXa
Fall and spring. 6 credits. Limited to department students. Prerequisites: ARCH 4102 and passing, but non-advancing, 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 non-advancing. Staff. 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. 5 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 option. Not offered every year. 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 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 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 an 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. Staff. 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 4102. Staff. Lectures, seminars, and independent research leading to complete development of the student's thesis program. General instruction in the conception, programming, and development of a thesis. This course is a prerequisite for ARCH 5901.
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. Prerequisite: students whose internships are in a country other than that of their citizenship. S-U or letter grades. 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. Corequisite: 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.

ARCH 6101 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, preservation, role of other than 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
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: 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 engaged, 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 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 reproduction 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
Fall or spring. 6 credits each semester. Prerequisite: permission of instructor. Not offered every year. B. MacDougall.

Visual Representation

ARCH 1501 Drawing I: Freehand Drawing
Fall. 2 credits. 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. Colloquium 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 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
Fall or spring. 3 credits. Prerequisite: 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. 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. I students or permission of instructor. M. Cruvellier.

For description, see ARCH 2603.

ARCH 5604 Structural Elements  
Fall or spring. 3 credits. Prerequisite: M. Arch. I students or permission of instructor. J. Ochshorn.

For description, see ARCH 2604.

ARCH 6603 Structural Systems  
Fall or spring. 3 credits. Prerequisite: M. Arch. I 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  
Fall. 3 credits. J. Ochshorn.

Properties of materials—their use and application to the design of buildings and building systems. Discussion of various methods of building construction and assembly.

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. 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 and permission of instructor. 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 (HVA) 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 3001. Corequisite: ARCH 3102. Letter grades only. Staff. The second half 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://instruct. cit.cornell.edu/courses/dea422/.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. For description, see ARCH 3601.

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 disciplines-specific areas including
architectural, 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 architecture” 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.
The history of the built domain; may be taken more than once to satisfy history of architecture requirements. Courses with the same number may be taken only once to satisfy history of architecture or in-college requirements.

**ARCH 3802: 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 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.
Explores the relationship between cinematic forms of mass media and architecture. Considers how cinema has been deployed as a tool in architectural production, how it has influenced the experience and design of space, and why it has been used as a vehicle for critical commentary on the urban condition, and the ways in which it is embedded 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 commodification and definition of cultural heritage, collective memory and civic identity, and the commodification or commercialization 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 Giovanni); 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 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 explaining Indian ethnology and history over two centuries. Attempts to evaluate the claim made by the historian James Ferguson 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 modernism 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 1940s.

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 century 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 emphasis 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 are also explored. 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 late 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. Prerequisite: 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 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 581 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 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
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

ARCH 6808 Seminar in 20th-Century Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

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
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

ARCH 6812 Seminar in 19th-Century Architecture, Building, and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

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.


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. Independent study for graduate students only.

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.

ARCH 9911 M.A. Thesis in the History of Architecture and Urbanism
Fall or spring. Variable credit; max. 12. Staff. Independent study for the master's degree.

ART

P. Phillips, chair (224 Tjaden Hall, 255-3558); M. Ashkin, director of graduate studies; R. Bertiona, J. Lacey, T. McGrain; E. Meyer, G. Page, M. Park, B. Perlus, B. Specter, 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 request to deviate 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 20–27 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 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); 4701, 4702 (senior thesis)

Painting: ART 1201, 2201, 3201, 3202, 4201, 4202 (senior thesis)

Photography: ART 1601, 2601, 2605/2604/2605/3601 (1 of 4); 4601, 4602 (senior thesis)

Printmaking: ART 1301/1302/1303 (2 of 3); 2301/2302/2303 (1 of 3); 4301, 4302 (22)

Sculpture: ART 1401, 2401, 3401, 4401 (14)

Second Area of Concentration

Drawing: ART 1501, 1502, 2501, 2502, independent study

Electronic Imaging: ART 2304/2702 (1 of 2); 2703, 3703/3704 (1 of 2)

Photography: ART 1201, 2201, 3201, 3202

Photography: ART 1601, 2601, 2605/2604/2605/3601 (2 of 4)

Printmaking: ART 1301/1302/1303 (2 of 3); 2301/2302/2303 (1 of 3); 3301

Sculpture: ART 1401, 2401, 3401, 4402

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 4801 Pre-Thesis in Combined Media and ART 4802 Thesis in Combined Media.

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.

Rome Program

Students in good standing who have completed the requirements of the first two years of the curriculum are eligible for participation in the Rome Program. Students are admitted to the program by application and review of their academic record. Applications are submitted to the Rome Program coordinator. Students applying to the Rome Program must meet with their faculty advisor and the department chair to obtain signatures of approval for admission to the program. Students in the departments wishing to attend the Rome Program must register for a full semester of credits. The department recommends that students attend the program during the first or second semester of their junior year. (Under special circumstances, seniors may petition to attend the Rome Program.) Only under special circumstances, and with prior petition and approval, are seniors allowed to attend the Rome Program. Students wishing to spend two consecutive semesters in Rome must submit a petition, which should include the proposed course schedule for both semesters and must have appropriate faculty approval.

Sample Rome Curriculum

ART 4000 Rome Studio

Requirement for Rome

B.F.A. students, fulfills 4 credits in a studio concentration

ART 2009 Site-Specific Processes

ART 3102* Modern Art in Italy

ART 3107 History of Art in Rome: Early Christian to the Baroque Age

or

ART 3108 History of Art in Rome: Renaissance in Rome and Florence

or

ART 3702 Special Topics in Art History (spring only)

or

ART 3702 Special Topics: Intermediate and Advanced Drawing

ITALA 1110/1120 Italian Language

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, city and regional planning, and the Independent Studio in Art. Students may petition to take more than 16 credits per semester in the Rome Program. Students must study in Rome for one or two academic semesters.

*Fulfills 3000-level theory and criticism requirement.

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: for example, 2600, 3600, 3740, 3760, 3605, 3650, 3550, 3750, 4523, 4507, 4547, 4600, 4816.

Non-Western: for example, 2350, 3550, 3510, 3800, 3805, 3855, 3850, 4523, 4510, 4578, 4850, 5571.

Three electives: any art history elective at the 3000 level or above or any architectural history elective. Also, approved 2000-level art history courses 2190, 2191, 2200, 2227, 2355, 2400. (Note: Offerings may vary each semester. Students are encouraged to consult
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year (Required Curriculum)</td>
<td></td>
</tr>
<tr>
<td>1101 Introductory Art Seminar</td>
<td>4</td>
</tr>
<tr>
<td>Art History Elective</td>
<td>4</td>
</tr>
<tr>
<td>1201 Introductory Painting</td>
<td>3</td>
</tr>
<tr>
<td>1401 Introductory Sculpture</td>
<td>3</td>
</tr>
<tr>
<td>1501 Drawing I</td>
<td>3</td>
</tr>
<tr>
<td>First-year writing seminar</td>
<td>3</td>
</tr>
<tr>
<td>AAP 1101 The World We Make</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Semester (Required Curriculum)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Art History Elective</td>
<td>4</td>
</tr>
<tr>
<td>1502 Drawing II</td>
<td>3</td>
</tr>
<tr>
<td>One of the following: 1301 Introductory Intaglio</td>
<td>3</td>
</tr>
<tr>
<td>1302 Introductory Graphics</td>
<td>3</td>
</tr>
<tr>
<td>1303 Introductory Lithography</td>
<td>3</td>
</tr>
<tr>
<td>First-year writing seminar</td>
<td>3</td>
</tr>
<tr>
<td>In/out-of-college elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Semester (Required Curriculum)</td>
<td></td>
</tr>
<tr>
<td>1601 Introductory Photography</td>
<td>3</td>
</tr>
<tr>
<td>1701 Electronic Imaging in Art</td>
<td>3</td>
</tr>
<tr>
<td>2501 Drawing III</td>
<td>3</td>
</tr>
<tr>
<td>Out-of-college elective (OCE)/Art History</td>
<td>3–4</td>
</tr>
<tr>
<td>OCE</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>15–16</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Semester</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-level studio</td>
<td>4</td>
</tr>
<tr>
<td>2000-level studio</td>
<td>4</td>
</tr>
<tr>
<td>In/OCE</td>
<td>3</td>
</tr>
<tr>
<td>3000-level course in theory and criticism</td>
<td>3</td>
</tr>
<tr>
<td>OCE</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Third Year</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Semester</td>
<td></td>
</tr>
<tr>
<td>2000-level studio</td>
<td>4</td>
</tr>
<tr>
<td>Art studio concentration</td>
<td>4</td>
</tr>
<tr>
<td>Art history elective or 3000-level course in theory and criticism</td>
<td>3–4</td>
</tr>
<tr>
<td>OCE</td>
<td>3</td>
</tr>
<tr>
<td>In/OCE</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>17–18</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Semester</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Art studio concentration</td>
<td>4</td>
</tr>
<tr>
<td>Art history elective or 3000-level course in theory and criticism</td>
<td>3–4</td>
</tr>
<tr>
<td>In/OCE</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>14–15</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fourth Year</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Semester</td>
<td></td>
</tr>
<tr>
<td>Pre-Thesis</td>
<td>6</td>
</tr>
<tr>
<td>2502 Advanced Drawing Workshop</td>
<td>3</td>
</tr>
<tr>
<td>In/OCE (two to three courses)</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Semester</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Thesis</td>
<td>6</td>
</tr>
<tr>
<td>In/OCE (three courses)</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The M.F.A. Program</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The master of fine arts degree program requires four semesters of</td>
<td></td>
</tr>
<tr>
<td>full-time study, equal to a minimum of 60 credits. Graduate work</td>
<td></td>
</tr>
<tr>
<td>done elsewhere or in the summer session is not applicable to the</td>
<td></td>
</tr>
<tr>
<td>M.F.A. degree. The curriculum leading to the master's degree is</td>
<td></td>
</tr>
<tr>
<td>flexible to accommodate the needs of the individual student and to</td>
<td></td>
</tr>
<tr>
<td>enable the student to partake of the greater Cornell community.</td>
<td></td>
</tr>
<tr>
<td>The ratio of graduate faculty to students allows an exceptional</td>
<td></td>
</tr>
<tr>
<td>opportunity for individual mentoring. Graduate students are</td>
<td></td>
</tr>
<tr>
<td>provided individual studios and have 24-hour access to studios and</td>
<td></td>
</tr>
<tr>
<td>labs.</td>
<td></td>
</tr>
</tbody>
</table>

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 (ART 6101, 6102, 6203, 6204). 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.

<table>
<thead>
<tr>
<th>Course Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Most courses in the Department of Art are open to students in any</td>
<td></td>
</tr>
<tr>
<td>college of the university who have fulfilled the prerequisites or</td>
<td></td>
</tr>
<tr>
<td>have permission of the instructor. Priority is given to B.F.A. majors</td>
<td></td>
</tr>
<tr>
<td>and AAP students. Fees are charged for all studio courses. See the</td>
<td></td>
</tr>
<tr>
<td>specific course description for course fees. To take advantage of</td>
<td></td>
</tr>
<tr>
<td>the specific opportunities afforded by summer study, several</td>
<td></td>
</tr>
<tr>
<td>courses are offered during summer session.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Guidelines for Independent Study</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A student who wishes to undertake an independent study must be a</td>
<td></td>
</tr>
<tr>
<td>junior and in good academic standing. Fine arts students must have</td>
<td></td>
</tr>
<tr>
<td>completed two years of the curriculum, including all first- and</td>
<td></td>
</tr>
<tr>
<td>second-year studios and four semesters of drawing. Students must</td>
<td></td>
</tr>
<tr>
<td>have prior approval to have an independent study count as a</td>
<td></td>
</tr>
<tr>
<td>drawing requirement. All students must have taken a minimum of one</td>
<td></td>
</tr>
<tr>
<td>Cornell art department course in the area of the proposed</td>
<td></td>
</tr>
<tr>
<td>independent study. It is recommended that the student take the</td>
<td></td>
</tr>
<tr>
<td>independent study with a professor with whom they have previously</td>
<td></td>
</tr>
<tr>
<td>studied. Out-of-department students may be exempt from the studio</td>
<td></td>
</tr>
<tr>
<td>sequence requirement at the discretion of the supervising professor.</td>
<td></td>
</tr>
<tr>
<td>Independent studies must be petitioned to count toward required</td>
<td></td>
</tr>
<tr>
<td>studio courses. Credit hours are variable up to a maximum of 4.</td>
<td></td>
</tr>
</tbody>
</table>
Courses in Theory and Criticism

AAP 1101 The World We Make
Fall and spring. 1 credit. S-U grades. Staff. For description, see p. 128.

ART 1101 Introductory Art Seminar
Fall. 1 credit. Prerequisite: B.F.A. students. S-U grades only. Staff. Students meet each week with a different member of the faculty. The varying artistic interests of the faculty are presented and discussed. A maximum of two absences are allowed except by permission of chairman.

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 composing, color perception, data acquisition, volumetric imaging, and historical precedents, primarily from the art world. Also included are other modes of imaging.

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 Contemporary Art
Fall or spring. Lab fee: $35. Staff. Students will be exposed to the ideas, issues, and methodology 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. Focuses on the role of the art critic and museum, and art collecting.

Related Courses

[ART 2009 Site-Specific Processes]

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. 1-3 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 5701 Theory Seminar
Fall or spring. 4 credits. Priority given to AAP and History of Art graduate students. Staff. Introduces students in art, art history, and architecture to diverse theoretical texts of relevance to the three fields. Readings include classic texts in post-structural theory and more recent writings in new areas of theory and artistic practice, including digital art, cyber-feminism, globalization, museums and museology, architecture in/as visual space, biotechnology, and artificial life, as well as issues in cognitive science and human-computer interaction centering on space and embodiment. Occasionally this seminar focuses on a single topic of convergence for these diverse areas.

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
Spring. 3 credits. Prerequisite: M.F.A. students. Staff. Seminar exploring selected writings on contemporary 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 M.F.A. students. Course instructor is the chair of student’s Special Committee. Students are responsible, under faculty direction, for planning their own
Undergraduate Studio Courses in Drawing

Fees for all drawing courses: $25

ART 1500  Summer Drawing I
Summer. 3-week session. 3 credits.
Course does not fulfill studio credit for BFA majors. 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. 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. 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, 3-week session. Course does not fulfill studio credit for BFA majors. 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, 6-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 are on helping the student observe and discover.

ART 2501  Drawing III
Fall. 3 credits. Prerequisite: ART 1502. 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, conceptual and formal considerations. 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
4701, 4702 $ 70

ART 1701  Electronic Imaging in Art
Fall or spring. 3 credits. 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. 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. Not offered every year. Staff.
Studio course that introduces students to digital video including camera, 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. 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 1700 and one of the following: ART 2304, 2702, 2703, or permission of instructor. 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 4701  Pre-Thesis in Electronic Imaging
Fall and spring. 6 credits. Prerequisites: ART 1701, 2304 or 2702, 2705, 4701. Staff.
For information, please call department.

ART 4702  Thesis in Electronic Imaging
Fall and spring. 6 credits. Prerequisite: ART 4701. Staff.
For information, please call department.
Undergraduate Studio Courses in Painting

Fees for painting courses (1201, 2201, 3201, 3202, 4201, 4202, 4209): $40

ART 1201 Introductory Painting
Fall, spring, or summer. 3 credits. 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. 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 4201 Pre-Thesis in Painting
Fall or spring. 6 credits. Prerequisite: ART 3202. Staff. Advanced study of painting through assigned and independent projects using a variety of materials leading to the formulation of a thesis project.

ART 4202 Thesis in Painting
Fall or spring. 6 credits. Prerequisite: ART 4201. Staff. Focused independent project demonstrating creative ability and technical proficiency. Projects are exhibited in an appropriate space at the end of the semester.

ART 4203 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

ART 1601 Photography I
Fall, spring, or summer. 3 credits. 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 1602 Black-and-White Photography
Summer, three-week session only. 3 credits. 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 1603 Color Photography
Summer, three-week session only. 3 credits. 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. Staff. Continuation of Photography I, concentrating on black-and-white photographic processes, history and theory of creative practice, and individual projects.

ART 2602 Color Photography
Fall and summer. 4 credits. Prerequisite: ART 1601 or ARCH 2501, or permission of instructor. Staff. Studio course in color photography with emphasis on camera skills, darkroom techniques, and the content of color photography.

ART 2603 Photo Processes
Fall, spring, or summer. 4 credits. Prerequisite: ART 1601 or ARCH 2501, or permission of instructor. 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 2604 Studio Photography
Fall or spring. 4 credits. Prerequisite: ART 1601 or ARCH 2501, or permission of instructor. 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 3601 Photography III
Fall, spring, or summer. 4 credits. Prerequisite: ART 1601, 2601, or permission of instructor. Staff. Continued study of creative use of photography, with emphasis on specialized individual projects.

ART 4601 Pre-Thesis in Photography
Fall or spring. 6 credits. Prerequisite: ART 2601, 2603. Staff. Studio course intended for photography majors and other qualified students.

ART 4602 Thesis in Photography
Fall or spring. 6 credits. Prerequisite: ART 4601. Staff. Studio course intended for photography majors and other qualified students. Advanced photography project to demonstrate creative ability and technical proficiency.

ART 4609 Independent Studio in Photography
Fall, spring, or summer. 4 credits, variable. Prerequisites: juniors in good academic standing and written permission of instructor. 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 their progress and evaluate their results.

Undergraduate Studio Courses in Printmaking

Fees for printmaking courses:
Intaglio (1301, 2301, 4301, 4302, 4309): $95
Screenprinting (1302, 2302, 4301, 4302, 4309): $45
Lithography (1303, 2303, 4301, 4302, 4309): $95
Expanded Print Forms (1304, 2304): $95

ART 1301 Introductory Intaglio
Fall and spring. 3 credits. 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. 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. 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. 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. Staff. Studio course in advanced etching techniques. Refinement of processes and
ideas through the uses of acquatint, 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 1301. 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. 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 4301 Pre-Thesis in Printmaking**

Fall or spring. 6 credits. Prerequisite: ART 3302. Staff.

Further study of the art of graphics through both assigned and independent projects executed in various media. Instruction through group discussions and individual criticism.

**ART 4302 Thesis in Printmaking**

Fall or spring. 6 credits. Prerequisite: ART 4301. Staff.

Advanced printmaking project to demonstrate creative ability and technical proficiency.

**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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Prerequisites</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>1401</td>
<td>Introduction to Sculpture</td>
<td></td>
<td>$50</td>
</tr>
<tr>
<td>2401, 3402, 3403, 4401, 4402</td>
<td>Sculptrure II</td>
<td></td>
<td>$75</td>
</tr>
<tr>
<td>1401</td>
<td>Pre-Thesis in Sculpture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2401, 3402, 3403, 4401, 4402</td>
<td>Sculpture III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1401</td>
<td>Sculpture IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2401, 3402, 3403, 4401, 4402</td>
<td>Sculpture V</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 their progress and evaluate their 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 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 on site. Course meets four weeks, 5X per week.

**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, 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 their progress and evaluate their results.
ART 3901 Media Arts Studio I (also ARCH 4509/6509, DANCE 3570)
Fall. 3 credits. Prerequisites: FILM 3770; junior standing and permission of instructor. Equipment fee: $50. Staff.
For description, see DANCE 3570. [ART 3902 Media Arts Studio II]
ART 4000 Rome Studio
Fall or spring. 4 credits. Fullfills 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 4801 Pre-Thesis in Combined Media
Fall or spring. 6 credits. Prerequisite: written permission of instructor on combined media thesis form (must be received in art department before enrollment in course). Students must enroll in pre-thesis course in their primary area of concentration. Lab fee: $70. Staff.
Students are responsible, under faculty direction, for planning their own projects and selecting the media in which they work. Projects should reflect experiences gained by exploring and combining various media including those taken in studio courses outside the department. Students select a faculty member from the area of concentration most appropriate to their area of combined media.
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 their progress and evaluate their results.

CITY AND REGIONAL PLANNING

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 for 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 areas such as, subutbs, 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 utilized by the College of Arts and Sciences, provided that they must complete at least one science course during their undergraduate career. They may apply advanced placement credit toward the distribution requirement in Groups 3 and 4 previously established by the College of Arts and Sciences or 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). Grades of S-U courses cannot be applied to the distribution requirements.

Basic Degree Requirements for students in the graduating classes of 2008-2009

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 requirement in groups Physical and Biological Sciences or in the groups Physical and Biological Sciences or toward satisfaction of the distribution requirement in Groups 1 and 2 previously established by the College of Arts and Sciences. 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
a. First-year writing seminars: two courses. Students earning a score of 5 on both English literature and English language exams will receive credits (in out-of-college electives) and place out of one first-year writing seminar.

b. Foreign language: three courses or qualification in one foreign language

c. Distribution Requirements: nine courses. Students must take a total of nine courses for the distribution requirement: four courses (of 3 or more credits each) from Groups 1 and 2 specified below, at least two of which are from Group 1, and at least one of which is from Group 2, five courses from Groups 3 and 4 specified below, with at least two in each group and two in the same department. No single course may satisfy more than one
distribution requirement. URS students must follow previously established College of Arts and Sciences guidelines specifying courses that meet the requirements for groups 1-4.

Group 1: Physical and biological sciences (two to three courses required)
Group 2: Quantitative and formal reasoning (one to two courses required)
Group 3: Social sciences and history (two to three courses required)
Group 4: Humanities and the arts (two to three courses required)

URS students will be provided a complete listing of courses in Groups 1 through 4 based on requirements previously established for the College of Arts and Sciences. Note: The Arts and Science distribution requirement was changed for entering freshmen in the class of 2007. Rather than selecting courses from Groups 3 and 4, Arts and Sciences students are required to complete five courses in at least four of the following five categories: Cultural Analysis (CA); Historical Analysis (HA); Knowledge, Cognition, and Moral Reasoning (KCM); Literature and the Arts (LA); and Social and Behavioral Analysis (SBA). Social science and humanities courses are marked individually by category, and any given department may offer courses that fall into distinct categories. URS students are encouraged to select their Group 3 and Group 4 courses from four of these five categories.

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 (spring, 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)
ECON 1110 Microeconomics (fall or spring, 3 credits)

Statistics: One course from a list of statistics courses (fall or spring, 3 credits)

3. Area Requirements: six CRP courses

The program requires that students take courses in six areas:

a. Design and Land Use (one course from designated list of courses)
   Students understand cities, suburbs, and regions in terms of aesthetic perception and patterns of human land use that shape physical, social and economic conditions.

b. Urban History, Society, and Politics (one course from designated list of courses)
   Students examine the growth, development, and character of today’s urbanized areas/residents, in light of complicated and evolving historical forces, social and economic concerns, and political constituencies, ideas, and choices.

c. Environment (one course from designated list of courses)
   Students become aware of the past, present, and future influence of the natural environment as modified by humans, in shaping, and in many instances substantially limiting urban growth and development.

d. Regional Development and Globalization (one course from designated list of courses)
   Students learn how far flung social and economic forces influence the economic health and general well-being of cities.

e. Methods for Planning and Urban Studies (one course in quantitative methods from designated list of courses)
   Students learn to use interviews, surveys, participant observation, and other non-quantitative methods to analyze attitudes, behaviors, trends, and other information related to urban development.

f. Methods for Planning and Urban Studies (one course in quantitative methods from designated list of courses)
   Students learn tools to analyze 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.

Basic Degree Requirements for students in the graduating class of 2010

Students in the Class of 2010 must meet the same requirements as those specified for the classes of 2008-2009 except that they must also complete AAP 1401 The World We Make (fall, 1 credit) under required courses for the major.

Basic Degree Requirements for students in the graduating classes of 2011 and beyond

Students in the classes of 2011 and beyond must meet the same requirements as those specified for the class of 2010 except that they must complete their Distribution Requirements (under General Education Requirements) in accord with the Distribution Requirements established for the College of Arts and Sciences: i.e., requirements specifying minimum number of courses and acceptable courses in Physical and Biological Sciences (PBS); Mathematics and Quantitative Reasoning (MQR); Cultural Analysis (CA); Historical Analysis (HA); Knowledge, Cognition, and Moral Reasoning (KCM); Literature and the Arts (LA); and Social and Behavioral Analysis (SBA).

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 submits an honors thesis under the guidance of his or her faculty advisor.

Urban Studies Concentration (non-URS majors)

The Urban and Regional Studies concentration 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) concentration, 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 300 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 concentration application form, available in 106 W. Sibley Hall. The AAP registrar verifies course completion and grades for concentration requirements and signs the application form. The URS program director (who also serves as URS concentration advisor) verifies completion of the concentration, 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 concentration on the student’s transcript.

URS Students in Concentrations Offered by Other Departments

The department recognizes concentrations earned within the university (accepting sets set by various colleges). URS students may apply for concentrations 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 concentration, 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 concentration on the student’s official transcript.

Off-Campus Opportunities

Cornell in Washington Program (C-i-W)

Students in good standing may earn degree credits through course work and an externship in Washington, D.C. Students at C-i-W 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.

**Cornell-in-Rome.** Students in good standing can spend a semester at AAP's teaching facility, Palazzo Lazzaroni, in Rome. They earn credits in courses taken with Cornell faculty members, assigned to Rome and with the resident faculty instructors. Courses are available in areas of urban development, regional development, architecture and art, Italian language, culture, and history.

**AAP in New York City.** The College of Architecture, Art, and Planning has a teaching facility in New York. The URS Program will have a New York semester for its students beginning in 2008–2009.

**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 a CALS major (e.g., 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 the 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 the University admissions 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, Graduate School, 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 by 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 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 coursework 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.) degrees 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.

**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. W. W. Goldsmith. 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: People, Production, and Planning in the Third World**

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, role, 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
Spring. 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 2610 Fieldwork in Urban Archaeology (also LA 2610)
Fall. 4 credits. S. Baugher.
For description, see LA 2610.

CRP 2930 Inequality, Diversity, and Justice (also GOVT 2935, SOC 2930, PHIL 1930)
Fall. 4 credits. R. Miller.
For description, see PHIL 1930.

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 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 play 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 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 CRP 6102)
Fall or 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 on the part 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.

CRP 3105 Urban Political Economy Seminar (also CRP 6105)
Fall or spring. 3 credits. Staff.
This course deals with current topics in urban political economy and examines past and present dayseizure 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 3180 Politics of Community Development (also CRP 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 3210 Introduction to Quantitative Methods for the Analysis of Public Policy
Spring. 3 credits. Not offered every year. K. Donaghy.
Introduction to the role and use of quantitative methods in the study of urban and regional issues, and the development and use of 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 3270 Regional Economic Impact Analysis (also CRP 6270)
Fall. 3 credits. Letter grades. Staff.
A central concern of practicing planners and economic development professionals is how different events affect the regional economy of concern. Some events are the result of policy choices, such as the closing of a military base or an increase in the local sales tax. Some are the result of exogenous economic forces such as out-migration of population, disasters, natural-floods and hurricanes. This course defines the context, a regional economy, for such analysis, and then presents analytical tools for estimating economic impacts. The major tool covered in depth is regional input-output. Most of the course is devoted to understanding and applying IMPLAN, a software and data system for performing regional input-output analysis at the county level.

CRP 3280 Overview: Quantitative Methods in Policy Planning (also CRP 5180)
Fall or spring. 3 credits. S-U or letter grades. R. Booth.
Introduces students to the basic tools that are used in policy analysis. The goal is to set the context for the techniques presented, to understand the questions that each addresses, to be aware of their potential and limitations, their range of applicability, and the pitfalls to be avoided.

CRP 3300 Neighborhood Planning Workshop (also CRP 5300)
Spring. 4 credits. Letter grades. R. Kiely.
Offers students the opportunity to collaborate with local residents, leaders, and officials in the development of revitalization plans that address the critical environmental, economic, social challenges confronting their neighborhoods. A participatory action research approach is used to co-produce professional-quality development plans with local stakeholder groups. Significant fieldwork required.

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. R. Kiely.
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 macro and macro policies affecting housing, education, immigration, health, legislation, legal affairs, mobility, 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 practices will also be addressed both from the perspective of non-profit 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. R. Kiely.
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 3411 Growing Up In Cities
Fall or spring. 4 credits. K. Driskell. Growing Up in Cities is a global action research initiative that involves young people (ages 10 to 15) in exploring their local environment, identifying priorities for change, and working to make change happen. It is a comparative research initiative focused on how young people perceive, value, and use the urban environment; how they shape and transform urban spaces; and how the urban environment shapes and transforms their lives. It is also a community change initiative that seeks to develop stronger environmental awareness among young people; foster meaningful child and youth participation in community affairs and decision making; and nurture positive relationships between young people and "enabling adults" to improve the local environment.

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 3500 Introduction to Environmental Planning (also CRP 6500)
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 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 of urban planning and development as practiced in cities and regions in specific areas outside the U.S., with a particular focus placed on how these institutional arrangements and conditions compare with the U.S.

CRP 3506 Environmental Planning Seminar (also CRP 6506)
Fall or spring. 3 credits. 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 actions of urbanists. The 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 3600 Post-industrial Cities and Towns of North America (also LA 2600/6660, CRP 6660)
CRP 3601 Museum and the Public Sphere (also CRP 6601)
Fall or spring. 4 credits. 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 structure 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 3650 Gender and Globalization (also FGSS 3650)
Fall. 3 credits. L. Beneria. For description, see FGSS 3600.

CRP 3670 Seminar in American Urban History (also CRP 6670)
Fall or spring. 3 credits. Prerequisite: permission from 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 3680 The History of Urban Form in America (also CRP 6680)
Fall or spring. 3 credits. Letter grades. M. Tomlan. Covers the history of city planning in America from colonial times to the early 20th century, including brief reviews of European influences on urban form. Lectures, discussions, and short papers.

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 question" 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 3770 The City in Brazil (also CRP 6670)
Summer. 3 credits. S-U or letter grades. W. Goldsmith. Students are taught in Brazil by professors from Cornell and the Instituto de Pesquisa e Planejamento Urbano e Regional (IPPUR), at the Federal University of Rio de Janeiro. Students will live in three Brazilian cities, on site with local scholars, top city officials, and activists. In Belem de Para, at the mouth of the Amazon River, the focus is on the environment and development. In Brasilia, the focus is on modernist planning of the new national capital with its signature Plano Piloto, the separated satellites cities, and migration from the Brazilian Northeast. In Rio de Janeiro, the focus is on housing, transportation, and the informal economy in the context of metropolitan growth and decline.

CRP 3780 Recycling and Resource Management (also CRP 5780)
Spring. 3 credits. S-U or letter grades. Not offered every year. Staff. Advanced resource-recycling and management systems are examined to the development of a sustainable society. This course reviews the political, technological, and economic strategies necessary for cities and communities to achieve a closed-loop resource-management system. Drawing from readings, speakers, and field trips that examine the cutting edge of recycling-program development, the course provides students with comprehensive exposure to leading practitioners and best practices in the recycling field. Open to undergraduate and graduate students. Graduate students have additional research requirements.

CRP 3800 Environmental Politics
CRP 3810 Principles of Spatial Design and Aesthetics (also CRP 5810)
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 preconditions to 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 3850 Special Topic: Pursuing a Municipal Policy Agenda Promoting Prosperity, Equity, and Sustainability**

Fall. 3 credits. Letter grades only. Offered in New York City. J. Nettleton. 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 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 3851 Special Topic: Remaking of New York City: Identity Formation, Image Making, and Community Building in the City's Newest Immigrant Communities**

Fall. 3 credits. Letter grades only. Offered in New York City. S. Beck. Students will learn about the history, culture, politics, and social life of NYC'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 3860 Planning for Sustainable Transportation (also CRP 6860)**

Spring. 3 credits. S-U or letter grades. 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 4040 Urban Economics (also CRP 5040)**

Spring. 4 credits. Prerequisite: microeconomics course. K. Donaghy. Analyzes urban phenomena from an economic point of view. Areas examined include economic aspects of urbanization processes and policies, determinants of urban growth and decline, urban land and housing markets, urban transportation, and urban public services. Some time is spent in discussing problems of cities in developing countries.

**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. 4 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 national 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 justified? Areas addressed are protected, 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. 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 multilayer 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, NTRRES 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 4480 Social Policy and Social Welfare (also CRP 5480)**

Spring. 4 credits. Not offered every year. S. Christopherson. Addresses conceptual issues underlying social policy and the provision of social welfare and analyzes how different positions are reflected in a set of current social-welfare controversies. The first part of the course introduces principles that guide the development of social policy, including fairness and justice. Various concerns of society are examined with reference to their influence on the nature and extent of social-welfare provision, comparing the United States with other industrialized countries. The second part examines how economic change and government policy affect social provision in the United States.

**CRP 4510 Environmental Law (also CRP 5510)**


**CRP 4530 Environmental Aspects of International Urban Planning (also CRP 6830)**

Fall. 4 credits. Open to advanced undergraduate and graduate students in planning, environmental studies, and related social and natural sciences. Staff. This seminar examines the ways in which roles of diverse environmental actors—international organizations, national bureaucracies, scientific communities, NGOs, and social movement organizations—formulate environmental debates and design conservation and remediation programs and policies in the Third World.

**CRP 4570 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 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 4740 Urban Transformations in the Global South (also CRP 6740)**
Fall or spring. 4 credits. S-U or letter grades. W. Goldsmith.
Economic globalization and the post-colonial political order are continually reshaping urban societies and landscapes in the global South, often by relegating everyday life to the margins and shrouding it in illegality. This course focuses on the spatial, social, and political dimensions of urban transformations, paying particular attention to such topics as competition among cities for international capital and its implications for sociospatial organization; dynamic interrelations between informality in local labor markets and in housing urban environmental challenges and municipal efforts to address them; and issues related to governance, social movements, and new formulation of citizenship.

**CRP 4770 Issues in African Development (also CRP 6770)**
Fall and spring. 1 credit. S-U grades only. M. Njoku.
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 advisor.

**CRP 4930 Honors Thesis Writing**
Fall or spring. 4 credits. Prerequisite: CRP 4920. Staff.
Each selected student works with his or her advisor.

**CRP 4940 Professional Practice Seminar: New York City**
Fall. 12 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 non-profit 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 4970 Independent Study**
Fall or spring. 4 credits. Prerequisite: junior or senior standing; permission of instructor. Staff.

**Graduate Courses and Seminars**
Courses numbered from 5000 to 5990 and 6000 to 6990 are generally considered 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 5040 Urban Economics (also CRP 4040)**
Spring. 4 credits. Not offered every year. Prerequisite: microeconomics course. K. Donaghy.
For description, see CRP 4040.

**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. 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 other, 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, strategies for increasing housing opportunities.

**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. I. Aziz.
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 5100 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. P. Clavel.
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 5200 Statistical and Mathematical Concepts for Planning
Fall. 3 or 4 credits. Not offered every year.
Staff.
Introduction to statistical and mathematical concepts and methods of importance in planning and policy analysis. Topics include matrix algebra, probability, sampling, estimation, and regression, and the use of a microcomputer statistical package.

CRP 5210 Mathematical Foundation for Planning Analysis
Fall. 1 credit. Meets for two hours, once each week, for approximately half the semester. Prerequisite: permission of department. S-U grades only. Not offered every year.
Staff.
Review of mathematical foundations for planning analysis. Topics include probability statistics, mathematical functions, and matrix algebra. Intended for students with prior course work as a refresher course in preparation for higher-level courses in planning analysis.

CRP 5220 Post-Fieldwork Writing Seminar in Urban Policy (also CRP 3220)
Spring. 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. R. Kiely.
For description, see CRP 5320.

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. Research lab exposes students to essential microcomputer applications and builds skills in writing and analysis.

CRP 5260 Overview: Quantitative Methods in Policy Planning (also CRP 3260)
Fall and spring. 3 credits. S-U or letter grades.
For description, see CRP 3260.

CRP 5290 Mathematics for Planners
Fall. 4 credits. variables. S-U or letter grades. Not offered every year.
Staff.
Covers basic mathematical concepts and techniques—with an emphasis on calculus—needed by the student who wishes to take intermediate-level courses in economics, urban and regional analysis, quantitative methods for the social sciences, and policy analysis. Topics include: matrix algebra, set theory, functions, differentiation, and integration.

CRP 5300 Neighborhood Planning Workshop (also CRP 3300)
Spring. 4 credits. K. Reardon.
For description, see CRP 3500.

CRP 5320 Real Estate Development Process
Fall. 3 credits. Letter grades. Fee for case studies paid by 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. R. Abrams.
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 5460 Introduction to Community and Environmental Dispute Resolution
Fall. 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 5480 Social Policy and Social Welfare (also CRP 4480)
Spring. 4 credits. Not offered every year.
S. Christopherson.
For description, see CRP 4480.

CRP 5510 Environmental Law (also CRP 4510)

CRP 5520 Land-Use Planning
Fall. 3 credits. R. Pendall.
Covers surveys, analyses, and plan-making techniques for guiding physical development of urban areas, location requirements, space needs, and interrelations of land uses. Emphasizes residential, commercial, and industrial activities and community facilities, and housing and neighborhood conditions. Lectures, seminars, and field exercises.

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 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 5620 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 5780 Recycling and Resource Management (also CRP 3780)  
Spring. 3 credits. S-U or letter grades. Staff. For description, see CRP 3780.

CRP 5810 Principles of Spatial Design and Aesthetics (also 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 5850 Sustainable Panama: An Interdisciplinary Workshop Course on the Future of the Panama Canal Metropolitan Landscape  
Winter. 4 credits. R. Trancik. For description, see Lorrie Walker in 106 W. Sibley Hall.

CRP 6011 Ethics, Development, and Globalization (also CRP 3011)  
Fall or spring. 4 credits. Staff. For description, see CRP 3011.

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 6070 GIS Applications Workshop  
Fall. 4 credits. Prerequisites: introductory GIS course or permission of instructor. Staff. Advanced GIS course that focuses on GIS applications and projects for one or more clients. During some semesters students work on their own projects. Contact the instructor directly to learn about project options for the current semester.

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 CRP 3102)  
Fall or spring. 3 credits. C. Lai. For description, see CRP 3102.

CRP 6105 (also CRP 3105) Urban Political Economy Seminar  
Fall or spring. 3 credits. Staff. For description, see CRP 3105.

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 6140 Gender and International Development (also FGSS 6140)  
CRP 6150 Current Issues and Debates on NGOs  
Fall. 3 credits. Prerequisite: graduate standing or permission of instructor. S-U or letter grades. N. Kudva. This seminar examines a range of topics that are key to understanding NGO actions: their effectiveness at service provision and advocacy; their political role in constructing social capital and strengthening civil society; their relationship with the state and with donor agencies; and issues related to organizational design for success. The intention is to gain a broad-based understanding of the role and development of NGOs. The emphasis throughout will be to critically evaluate the literature, research, and accounts on NGOs as both institutional actors in the development arena and as bounded organizations at the local level: a task that is complicated by the heterogeneity of contexts and organizational types.

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 6270 Regional Economical Impact Analysis (also CRP 3270)  
Fall. 3 credits. Letter grades. Staff. For description, see CRP 3270.

CRP 6320 Methods of Regional Science and Planning I  
Spring. 4 credits. variable. Staff. 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 6350 Workshop: State Economic Development Strategies  
Fall or spring. 4 credits. S-U or letter grades. S. Christopherson. The purpose of this workshop is twofold: (1) to provide students with research tools useful in developing state-level economic-development strategies; and (2) to provide a critical understanding of the primary economic-development strategy used by U.S. state policymakers: firm-specific subsidies. The course consists of lecture and discussion meetings. The workshop sessions include exercises in qualitative information gathering on economic-development topics, use of the census in combination with geographic information systems for analysis and presentation; and shift-share analysis.

CRP 6370 Regional Development Planning: An International Perspective  
CRP 6380 Planning and the Global Knowledge Economy: Sustainability Issues  
CRP 6411 Growing Up In Cities (also CRP 3411)  
Fall or spring. 4 credits. Staff. For description, see CRP 3411.

CRP 6420 The Micro-Politics of Participatory Planning Practices  
Spring. 4 credits. variable. J. Forester. This seminar explores issues of "practice" (rhetoric and negotiation, interpretation and judgment, narrative and recognition) as they influence democratic deliberations involving questions of ethics and argument, participation and identity, historical trauma and working-through, and more. The approach taken can be called a "critical pragmatism." Practitioners’ oral histories are used to investigate the challenges of participatory planning practices.

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 (also CRP 3502) Suburbia  
Fall or spring. 3 credits. Staff. For description, see CRP 3502.
Opportunity.

on an actual property and market course includes a semester-long project based presentations from visiting professionals. The discussed. Classes are supplemented by markets are also explored. Composition of competitive housing products in today's construction issues, marketing, and sales project financing and feasibility, schedule and product selection and design considerations, feasibility, land planning and acquisition, finished product. Topics include market from site acquisition through delivery of the construction. 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.

Real Estate Law
Spring. 3 credits. 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.

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 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 7950 Professional Writing and Publishing (Colloqu) Fall or spring. 2 credits. S-U grades only.
Not offered every year. Staff.
Individual and group projects culminating in the production of a professional journal.

CRP 7970 Graduate Independent Study Fall or spring. 4 credits, variable. Staff.
Prerequisites: graduate student standing and permission of instructor. Staff.
For description, see department coordinator, 106 West Sibley Hall.

CRP 8000 Advanced Seminar in Urban and Regional Theory I Fall. 5 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 [CRP 8100 Advanced Planning Theory]

CRP 8300 Seminar in Regional Science, Planning, and Policy Analysis Fall or spring. 4 credits, variable. S-U grades only. Staff.
Provides an opportunity to review some of the literature and current research in regional science, planning, and policy analysis. Specific topics covered vary each year. Empirical and analytical research are emphasized. Students are expected to prepare and present a research paper during the semester on some aspect of the topics under review.

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. 2 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

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: All of the following courses are offered through the College of Agriculture and Life Sciences except LANAR 4970, 5240, and 5250.

LA 1410 Grounding in Landscape Architecture Fall. 4 credits.

LA 1420 Grounding in Landscape Architecture Spring. 4 credits.

LA 2010 Medium of the Landscape Fall. 5 credits.

LA 2020 Medium of the Landscape Spring. 5 credits.

LA 2150 Writing Seminar: Engaging Places Fall. 4 credits.

LA 2520 Daily Life in Ancient Israel Spring. 3 credits.

LA 2610 Fieldwork in Urban Archaeology (also CRP 2610) Fall. 4 credits.

LA 2620 Laboratory in Landscape Archaeology (also ARKEO 2620) Spring. 3 credits.

LA 2660 Jerusalem through the Ages Fall. 4 credits.

LA 2820 Photography and the American Landscape Fall. 4 credits.

LA 3010 Integrating Theory and Practice I Fall. 5 credits.

LA 3020 Integrating Theory and Practice Fall. 5 credits.

LA 3160 Site Engineering II Fall. 2 credits.

LA 3180 Site Construction Spring. 5 credits.

LA 3600 Pre-Industrial Cities and Towns of North America (also CRP 3600/6660, LA 6660) Spring. 5 credits.

LA 4010 Advanced Synthesis: Project Design Fall. 5 credits.

LA 4020 Integrating Theory and Practice II Spring. 5 credits.

LA 4030 Directed Study: The Concentration (also LA 6030) Fall or spring. 1 credit.
transportation planning, national parks, and other open-space designs.

**LA 5450 The Parks and Fora of Imperial Rome**
Spring. 3 credits.

**LA 5820 Photography and the American Landscape Architecture**
Fall. 3 credits.

**LA 5900 Theoretical Foundations**
Fall. 3 credits.

**LA 5980 Graduate Teaching**
Fall or spring. 1–2 credits.

**LA 6010 Integrating Theory and Practice I**
Fall. 5 credits. Prerequisite: graduate standing.

**LA 6020 Integrating Theory and Practice II**
Spring. 5 credits. Prerequisite: graduate standing.

**LA 6030 Directed Study: The Concentration (also LA 4030)**
Fall or spring. 1 credit.

**LA 6160 Site Engineering**
Fall. 2 credits.

**LA 6180 Site Construction**
Spring, weeks 8–15. 5 credits.

**LA 6660 Pre-Industrial Cities and Towns of North America (also CRP 3600/6660, LA 2600)**

**LA 6900 Methods of Landscape Architectural Inquiry**
Fall or spring. 1–3 credits.

**LA 6940 Special Topics in Landscape Architecture**
Fall or spring. 1–3 credits.

**LA 7010 Urban Design and Planning: Designing Cities in the Electronic Age (also CRP 5550)**
Fall. 5 credits.

**LA 7020 Advanced Design Studio**
Spring. 5 credits.

**LA 7920 Landscape Preservation: Theory and Practice**
Fall. 3 credits.

**LA 8000 Master's Thesis in Landscape Architecture**
Fall or spring. 9 credits.

**Chen, Xiaowen, M.F.A., Illinois State U. Visiting Assoc. Prof., 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**

**Crusellier, Mark R., M.Eng., Ph.D., McGill U. (Canada). Assoc. Prof., Architecture**

**Curry, Milton S. F., M. Arch., Harvard U. Assoc. Prof., Architecture**

**Czamanski, David, Ph.D., U. of Pennsylvania. Assoc. Prof., Emeritus, City and Regional Planning**

**Dalton, Raymond, Ph.D., Purdue U. Sr. Lec., Art**

**Daly, Norman, M.A., Ohio State U. Prof., Emeritus, Art**

**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**

**Forister, John, Ph.D., U. of California, Berkeley. Prof., City and Regional Planning**

**Forsyth, Ann, Ph.D., Cornell U. Prof., City and Regional Planning**

**Goehrer, Werner H., M. Arch., Cornell U. Prof., Architecture**

**Goldsmith, William W., Ph.D., Cornell U. Prof., 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**

**Kiel, 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, Bonnie G., Ph.D., Ohio State U. Prof. Architecture**

**Lewis, David B., Ph.D., Cornell U. Prof., City and Regional Planning**

**Loccey, Jean N., M.F.A., Ohio U. Prof., Art**

**Lynch, Barbara, Ph.D., Cornell U. Visiting Asst. Prof., City and Regional Planning**

**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**


**Mikus, Elenore, M.A., U. of Denver. Prof., Emeritus, Art**

**Miller, John C., M. Arch., Cornell U. Prof., Emeritus, Architecture**


**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**

**Baughler, Sherene, Ph.D., SUNY, Stony Brook. Visiting Prof., City and Regional Planning**

**Benedict, Lourdes, Ph.D., Columbia U. Prof., City and Regional Planning**

**Bertola, 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**
Mulcahy, Vincent J., M. Arch., Harvard U.  
Assoc. Prof., Architecture


Olpavala, Porus, Ph.D., Cornell U. Prof., City and Regional Planning

Ostendarp, Carl, M.F.A., Yale School of Art

Otto, Christian F., Ph.D., Columbia U. Prof., Architecture

Ovaska, Arthur, M. Arch., Cornell U. Assoc. Prof., Architecture


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

Perls, 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


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


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. Assoc. 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
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 base office in Stimson Hall provides academic advising for students interested in the marine sciences and administers the SEA Semester program for Cornell students pursuing studies at Woods Hole, Mass., or aboard the schooner Robert C. Seamans or brigantine Corwith Cramer.

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, 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 advising and counseling resources of 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 1–5 must be taken for a letter grade. 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, 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
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, 8, 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 BIOI 4880. Note: BIOI 2410 Botany is a prerequisite course to BIOI 4880.

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. 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 disciplines, 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 as follows:

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 6 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 4510 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 3390 Animal Physiology Laboratory; BIOAP 4160 Cellular Physiology and Genomics Laboratory; BIOBM 4400 Laboratory in Biochemistry and Molecular Biology; BIONB 4010 Principles of Neurophysiology.

2. **Biochemistry**: BIOBM 4400 Laboratory in Biochemistry and Molecular Biology; physical chemistry (CHEM 2870–2880 or 3890–3900 or 3890–3880; 6 credits of organic chemistry (CHEM 3570–3580 or CHEM 3590–3600); plus one of the following two alternatives. Students wanting to maximize their background in chemistry should take CHEM 3000 Quantitative Chemistry and CHEM 3010 Honors Experimental Chemistry I (Students who choose this option should not take CHEM 2510). Students wanting to gain further depth in biochemistry and related disciplines should take BIOBM 4320 Survey of Cell Biology and either CHEM 3000 Quantitative Chemistry or CHEM 2520 Elementary Experimental Organic Chemistry. Students choosing the first alternative are encouraged to take BIOBM 4320.

   **Notes:**
   - CHEM 2880 is designed for biologists. Five hours of biochemistry are recommended (3310 and 3320, or 3300 and 3340 or 3330 and 3340). Students interested in graduate work in biochemistry should take PHYS 2207–2208 and should consider taking CHEM 3890–3900 and its prerequisites. They should be sure to complete CHEM 2070–2080 or 2150–2160 during their freshman year.
   - Biology majors in the College of Agriculture and Life Sciences who select the biochemistry program are allowed to take up to 61 credit hours in the endowed colleges because of the high number of required endowed courses for this program of study.

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 are 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 EE 1510, Introduction to Computer Programming.

b. One additional course in mathematics (MATH 2210 Linear Algebra; or MATH 2510 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

- BIOE 3620 Dynamic Models in Biology
- BIOE 4000 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 BIOE 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 courses for this Program of Study.

7. One course must be chosen from list (a) and one course must be taken from list (b) or (c). The program of study in Ecology and Evolutionary Biology: BIOE 2610 Ecology and the Environment. Effective fall semester 2005, new 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.

- Principles: BIOE 4530 Speciation; BIOE 4580 Community Ecology; BIOE 4600 Theoretical Ecology; BIOE 4640 Macroevolution; BIOE 4800/ENTOM 4700 Ecological Genetics; BIOE 4780 Ecosystem Biology; NTRES 3100 Applied Population Ecology

- Organisms: BIOE 2740 The Vertebrates: Structure, Function, and Evolution; BIOE 3730 Biodiversity and Biology of the Marine Invertebrates; or BIOE 3760 Marine Invertebrate Zoology; BIOE 4500 and 4501 Mammalogy, lec and lab; BIOE 4700 and 4701 Herpetology lec and lab; BIOE 4750 Ornithology; BIOE 4760 Biology of Fishes; ENTOM 2120 Insect Biology; BIOI 2410 Introductory Entomology; BIOI 4840 Plant Evolution and the Fossil Record; PLPA 3090 Fungi; BIOE 4490 Marine Botany.

- Ecological and Evolutionary Processes: BIOE 2630 Field Ecology; BIOE 2650 Tropical Field Ecology and Behavior; NS/ANTHR 2750 Human Biology and Evolution; BIOE/BIONB/ENTOM 3690 Chemical Ecology; BIOE/EAS 3500 Dynamics of Marine Ecosystems; BIOE/MATH 3620 Dynamic Models in Biology; BIOE 4600 Plant Behavior—Induced Plant Responses to Biotic Stress; BIOE/ENTOM 4570 Insect Ecology; BIOE/NTRES 4560 Stream Ecology; BIOE 4570 and 4571 Limnology; Ecology of Lakes; lec and lab; BIOE/EAS 4620 Marine Ecology; BIOE 4660 and 4661 Physiological Plant Ecology; lec and lab; BIOE/HORT 4730 Ecology of Agricultural Systems; NTRES 4210 Forest Ecology; BIOE/4130 Research in Marine Biology, Nature 24220 and 2421 Wetland Ecology and Management, lec and lab; BIONM 4180 Microbial Ecology; CSS/HORT 4660 Soil Ecology; BIOE/ENTOM 4400 Phylogenetic Systematics; BIOI 4470 Molecular Systematics; BIOE/ENTOM 4530 Principles and Practice of Historical Biogeography; BIOE/EAS 4750 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 (BIOE): BIOE 3890 Field Microbial Ecology; BIOE 3900 Coastal Ecology and Bioclimates; BIOE 3210 Anatomy and Function of Marine Vertebrates; BIOE 3740 Field Ornithology; BIOE 3770 Diversity of Fishes; BIOE 4770 Marine Vertebrates; and BIOE 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:

- 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.

- A course with a laboratory.

- A minimum of two upper-level (3000 and above) courses of 2 or more credits each.

100-level courses are not acceptable for meeting any of these requirements. BIOE 4980 may not be used to fulfill the requirements of this program.
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. 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 4000 level or higher; BIOJM 4802 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 3340 Larval Insect Biology; ENTOM 3520 Medical and Veterinary Entomology; ENTOM 4440 Integrated Pest Management; ENTOM 4550 Insect Ecology; ENTOM 4630 Invertebrate Pathology; ENTOM 4850 Insect Physiology

Group b: ENTOM 3150 Spider Biology; ENTOM 3250 Insect Behavior; ENTOM 3440 Insect Conservation Biology; ENTOM 3600 Chemical Ecology; ENTOM 5700 Pesticides, Environment, and Human Health; ENTOM 4530 Principles and Practice of Historical Biogeography; NTRGES 4560 Stream Ecology; ENTOM 4700 Ecological Genetics; ENTOM 4770 Biological Control; ENTOM 4900 Insect Toxicology

8. Microbiology: A student in the Microbiology program of study must complete BIOM 2900 General Microbiology, Lec; BIOM 2910 General Microbiology, Lab. At least 8 additional credits are required, which must include at least one of the following courses: BIOM 4140 Bacterial Diversity; BIOM 4160 Bacterial Physiology; BIOM 4180 MicrobialEcology; BIOM 4850 Bacterial Genetics.

Additional approved courses are included in the list below. Students are invited to complete their requirements in one of the following areas of interest: (a) Prokaryotic Biology, (b) Molecular Microbiology and Biotechnology, and (c) Pathogenic Microbiology. Courses acceptable to the program of study in any of the areas related to a particular area of interest are:

Prokaryotic Biology: BIOM 3910 Advanced Microbiology Laboratory; BIOM 4140 Bacterial Diversity; BIOM 4160 Bacterial Physiology; and BIOM 4180 Microbial Ecology.

Molecular Microbiology and Biotechnology: BIOM 3910 Advanced Microbiology Laboratory; BIOM 4140 Bacterial Diversity; BIOM 4160 Bacterial Physiology, and BIOM 4200 Multicellular Organisms; BIOM 4850 Bacterial Genetics; and BIOM 3940 Applied and Food Microbiology.

Pathogenic Microbiology: BIOM 4040 Pathogenic Bacteriology and Mycology; BIOM 4050 Principles of Viral Pathology; BIOM 4160 Bacterial Physiology; BIOM 4200 Multicellular Organisms; BIOM 4850 Bacterial Genetics; and BIOM 3940 Applied and Food Microbiology.


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: Neurobiology and Behavior I and II (BIONB 4890, 4900), BIOM 3210, 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 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; BIOG 3570–3580 or 3590–3600; NS 3470 Human Growth and Development; NS 4210 Nutrition and Exercise; NS 6030 (alternate years) Mineral Nutrition; Metabolic, Health, and Environmental Aspects; NS 6140 Topics in Maternal and Child Nutrition; NS 6530 Micronutrients: Function, Homeostasis, and Metabolism; and NS 6320 Regulation of Macronutrient Metabolism. Some courses require NS 1150 Nutrition, Health, and Society, which may be used as part of the additional 9 credits.

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 will count toward the 100 hours required in AAS 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 BIONB 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: BIONB 4240...
13. **Systematics and Biotic Diversity**: A minimum of 13 credits from the following two groups, including at least 7 credits from group a and three 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.

- **Group A**
  - BIOG 3400 (3 credits)
  - BIOG 3405 (3 credits)
  - BIOG 3410 (3 credits)
  - BIOG 3420 (3 credits)
  - BIOG 3430 (3 credits)
  - BIOG 3431 (3 credits)

- **Group B**
  - BIOG 3500 (3 credits)
  - BIOG 3510 (3 credits)
  - BIOG 3520 (3 credits)
  - BIOG 3530 (3 credits)
  - BIOG 3540 (3 credits)

**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 design a course 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 biology core courses or biology core courses and an additional 3 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, 3310–3320, or one year of general chemistry (CHEM 1570 or 3570–3580) are prerequisites.
2. **Evolutionary biology**: BIOEE 4530, 4640, or 4790
3. **Paleobiology**: BIOPL 4400
4. **Phylogenetic Systematics**: BIOPL 4420
5. **Current Topics in Ethnobiology**: BIOPL 4480
6. **Plant Cell Biology**: BIOPL 4520
7. **Systematics of Tropical Plants and Field Laboratory**: BIOPL 4521
8. **Systematics of Tropical Plants**: BIOPL 4522
9. **Plant Development**: BIOPL 4400
10. **Domestication, and Diversity**: BIOPL 4220
11. **Molecular Plant-Pathogen Interactions II**: BIOPL 4822
12. **Molecular Plant-Pathogen Interactions I**: BIOPL 4822
13. **Molecular Plant-Microbe Interactions**: BIOPL 4822
14. **Plant Gene Evolution**: BIOPL 4822
15. **Genetic Engineering of Plants**: BIOPL 4822
16. **Metabolomics and Systems Biology**: BIOPL 4822
17. **Plant Molecular Biology**: BIOPL 4822
18. **Molecular Plant-Pathogen Interactions III**: BIOPL 4822
19. **Molecular Plant-Pathogen Interactions II**: BIOPL 4822
20. **Molecular Plant-Pathogen Interactions I**: BIOPL 4822
21. **Molecular Plant-Microbe Interactions**: BIOPL 4822
22. **Plant Gene Evolution**: BIOPL 4822
23. **Genetic Engineering of Plants**: BIOPL 4822
24. **Molecular Plant-Pathogen Interactions III**: BIOPL 4822
25. **Molecular Plant-Pathogen Interactions II**: BIOPL 4822
26. **Molecular Plant-Microbe Interactions**: BIOPL 4822
27. **Plant Gene Evolution**: BIOPL 4822
28. **Genetic Engineering of Plants**: BIOPL 4822
29. **Molecular Plant-Pathogen Interactions III**: BIOPL 4822
30. **Molecular Plant-Pathogen Interactions II**: BIOPL 4822
31. **Molecular Plant-Microbe Interactions**: BIOPL 4822
32. **Plant Gene Evolution**: BIOPL 4822
33. **Genetic Engineering of Plants**: BIOPL 4822
34. **Molecular Plant-Pathogen Interactions III**: BIOPL 4822

**Notes**

- **BIOG 4990 Independent Research** may not be used to fulfill any requirement for the minor. S/U grading is allowed. With the exception of transfer and study abroad students, no biology courses taken at other institutions will count toward the minor.
- 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. 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 in 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 90 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 earns credit for research 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 487–494 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 1107–1110; and one during the eight-week summer session: BIOG 1107–1108. BIOG 1101–1104, 1105–1106, and 1107–1108 are intended for biological sciences majors and other students needing 8 credits from an introductory course 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).

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. For lect of fall semester, F Aug. 29. No admittance after second week of classes. Evening prelms: fall, Sept. 25 and Nov. 4; spring, Feb. 19 and March 31. 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 register for labs 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 Sept. 1; first lab of spring: week of Jan. 19. S-U or letter grades by permission of instructor.

K.-C. Chen.

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 of cells, plant biology and a 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 (pinning 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 lect of fall semester R Aug. 28, 9:05; additional study and lab. D. Campbell.

Designed primarily for biology majors, preprofessionals, and other students who desire a 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, and 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 predissected 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: instruc1.cit.cornell.edu/courses/biog105.

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, a grade of D or better in the 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 organism 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 sciences or preprofessional 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, BIOG 1109 may not be taken after BIOG 1102 or 1107, and BIOG 1110 may not be taken after BIOG 1101, 1105, or equivalent. Note: This course may not satisfy prerequisite for upper-level courses in biology. Letter grades only. Prerequisites: permission of the instructor.

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 Simons 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 3050 Basic Immunology Lectures (also VETMI 3150)
Fall. 3 credits. Highly recommended: basic courses in microbiology, biochemistry, and genetics. S-U or letter grades. Lec. J. A. Appleton. For description, see VETMI 3150.

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. S-U grades only. J. A. Appleton. Prerequisite: research experience. Priority given to students accepted into Biology Honors Program. L. Southard and G. Hess.

Multiple topics and sections will be offered each semester.

BIOG 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.

Written by Cornell faculty members, this course is 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. 1–4 credits per semester with 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. S-U grades by 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, 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 studying the human behavior, mental, and physical capabilities). Current evidence on the effects of gender on nonreproductive aspects of life 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 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. M. Baustian.

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 3120 Farm Animal Behavior (also ANSC 3050)**

Spring. 2 credits. Prerequisites: one year introductory biology, and introductory animal physiology (ANSC 1100 or equivalent is sufficient or BIOAP 3110). Recommended: at least one animal production course or equivalent experience. S-U or letter grades. P. Perry and K. A. Houpt.

For description, see ANSC 3050.

**BIOAP 3160 Cellular Physiology**

Spring. 3 credits. Pre- or corequisite: BIOBM 3510 and 3520 or 3530. 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**

Fall. 4 credits. Limited to 40 students per lab sec. 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**

Spring. 4 credits. Prerequisite: one year introductory biology. S-U or letter grades. Offered alternate years; next offered 2009–2010. 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**

Spring. 4 credits. Limited to 24 students. For pre-med, pre-vet, juniors, seniors, and graduate students interested in biomedical science. Pre- or corequisite: BIOAP 3160 or BIOBM 4320 or permission of instructor. Letter grades only. N. A. Lorr, H.-H. Chuang, 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, next offered 2009–2010. 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. Offered alternate years; next offered 2009–2010. P. A. Johnson.

For description, see ANSC 4270.

**BIOAP 4580 Mammalian Physiology**

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 will 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 underlying roots of their molecular etiology. Weekly problem sets count 50 percent of the final grade.

**BIOAP 4750 Mechanisms Underlying Mammalian Developmental Defects (also NS 4750)**

Spring. 3 credits. Prerequisites: BIOBM 3300, 3310–3320, or 3330 (may be taken concurrently). S-U or letter grades. Offered alternate years; next offered 2009–2010. 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 4890)**


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 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.

BIOAP 7140 Cardiac Electrophysiology
Fall. 1 credit. S-U grades only. Offered alternate years. 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 7150 Animal Welfare
Fall. 1 credit. Prerequisite: BIOAP 3110 or equivalent. S-U or letter grades. Offered alternate years. K. A. Houpt. Emphasizes stress in domestic animals.

BIOAP 7200 Animal Physiology and Anatomy Seminar
Spring and fall. 1 credit each semester. Prerequisite: admission to graduate field of physiology. S-U or letter grades. R. Davisson. 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. 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. Lectures, laboratories, discussions, and seminars on specialized topics.

BIOCH 4040 Stem Cells and Veterinary Biotechnology
Fall or spring. 3 credits. Prerequisites: one year introductory biology, one year organic 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 or letter grades by permission of instructor. Lec. D. P. Schutte and M. W. Feinberg. Theoretical and practical aspects of stem cell research and its applications in veterinary medicine and regenerative medicine.

BIOCH 5320 Principles of Molecular Biology
Spring. 3 credits. Prerequisites: one year introductory biology, one year organic chemistry, and CHEM 1570, or 3570–3580, or equivalents, or permission of instructor. May not be taken for credit after BIOBM 3300 or 3330. S-U or letter grades. Offered alternate years. R. Gilmour. Comprehensive course on 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 technique, genomics, and proteomics.

BIOG 4990 Undergraduate Research in Biology (BIOG 4990)
S-U or letter grades by permission of the 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. Offered alternate years. J. E. Fortune, P. A. Johnson, and staff. Credit may be awarded to a maximum of two consecutive semesters.

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. Lec. J. Blankenship. Six professors discuss their research and promising new areas for research in the future.

BIOBM 3300–3320 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, 3330, or 3350. S-U or letter grades. Evenings only. Fall, Oct. 2 and Nov. 4; spring, Feb. 19 and March 31. 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 3350. S-U grades by permission of instructor. Lec.; evening prelim Oct 23 G. W. Feinberg. 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 technology, genomics, and proteomics.

BIOBM 3330 Principles of Biochemistry: Proteins, Metabolism, and Molecular Biology
Summer, six-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. S. Elly. 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 3350 or 3310–3320 (BIOBM 3320 may be taken concurrently). Corequisite: BIOBM 3340. 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 3390 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 3350) and permission of instructor. Lec. Letter grades. M. Inada. 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 productive 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 oflec, S. Sept. 13, 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. Evening prelims Mar. 3 and Apr. 16. 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, and BIOBM 6320, 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: BIOGD 4320. S-U or 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 nuclease acid vaccines, gene therapy, and high-tech agricultural products. Additional non-transgenic topics will 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 4350–4360 Undergraduate Biochemistry Seminar
1 credit; may be repeated. Prerequisites: upperclass 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 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. L. 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 sections.

BIOBM 4380 The RNA World
Spring, 3 credits. Prerequisites: BIOBM 3300 or 3310/3320 or 5330, or permission of instructor. A. Ke.
Part of the excitement about “the RNA world” stems from the notion 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 3350) 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 hereditary, autoimmune, and degenerative diseases, as well as metastatic cancer. The study of human genetics is approached with an emphasis on methods used to identify the genetic causes of diseases that have been proposed 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 (three-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 BIOBM 4300)
For description, see BIOBM 4300.

BIOBM 4500 Principles of Chemical Biology (also CHEM 4550)
Fall. 3 credits. Prerequisites: CHEM 3570–3580 or 3590–3600 or equivalent. Next offered 2009–2010. T. P. Begley.
For description, see CHEM 4550.

BIOBM 4834 Molecular Aspects of Plant Development I (also F&ML 4834)
Fall. 1 credit. 12 lec TBA. J. B. Nasrallah.
For description, see BIOL 4834.

BIOBM 4850 Bacterial Genetics (also BIOIM/BIOGD 4850)
Fall. 2 or 3 credits; optional credit for registered students with permission of instructor to review previous material. Prerequisite: BIOGD 2810. Recommended: BIOI 2900 and BIOBM 3300 or 3310 and 3320 or 3330. Lec. J. E. Peters.
For description, see BIOI 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 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.

BIOBM 6310 Protein Structure, Dynamics, and Function
Fall. 3 credits. Prerequisites: BIOBM 3300 or 3350 or 3310–3320 and organic chemistry. Recommended: physical chemistry course; S-U or letter grades. 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.
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...
sibility. Together with BIOBM 4370, 632, and 6390 this course provides broad coverage of the cell biology subject area.

**BIOBM 6390 The Nucleus**
Spring. 2 credits. Prerequisites: BIOBM 3300 or 3330 or 3310–3320, or equivalent. Recommended: BIOGD 2810. Lec. J. T. Lis. 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 grades by permission. Offered alternate years; next offered 2009–2010. 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)]**
Fall. 3 credits. Prerequisite: permission of instructor. Lec. Next offered 2009–2010. 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. Sen. 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 3350 or 3310–3320 or equivalent. S-U grades only. 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 in 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. 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 M. 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. Sen. 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 (BIOAP 6190, NS 6020)
Teaching Experience (BIOG 4980)
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. 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 2510 Ecology and the Environment**
Fall or summer (three-week session). 4 credits. Prerequisite: one year introductory biology. S-U or letter grades. Fall: A. Kelsey, C. L. Goodale, and staff. 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. Agrawal.
Field exercises designed to give students direct experience with fieldwork, with an emphasis on developing observational skills, journal keeping, and a landscape perspective. Topics include plant succession, niche relationships of insects, influence of herbivores and predators 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 12 students; minimum of 8. Prerequisite: permission of instructor. Intended for students with limited or no bird knowledge. S-U or letter grades. Daily fieldwork, disc, reading, and individual project. Next offered 2009–2010. A. A. Dhondt.

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. 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. 3 credits. 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. One Sat. a.m. field trip. Offered alternate years; next offered 2009–2010. J. W. Fitzpatrick.

BIOEE 2740 The Vertebrates: Structure, Function, and Evolution
Spring. 4 credits. Prerequisite: one year introductory biology, Fed: $25. S-U or letter grades. K. R. Zamudio. 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, Feb. 26 and Mar. 31. Fall, I. J. 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 bases 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 2850 Dynamics of Marine Ecosystems (also EAS 3500)]
Fall. 5 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; next offered 2009–2010. 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 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 2009–2010. S. P. Ellner and J. M. Guckenheimer.

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. D. W. Winkler and staff.
Detailed, hands-on experience with the methods commonly used in ornithological field research, focusing on different methodologies used to obtain data on organismal structure and function, life history characteristics, and behavior. While being immersed in ongoing, intense research program in the Ithaca area, students learn about the types of evolutionary and ecological questions that can be addressed through use of different research methodologies, experimental design, and basic statistical analysis techniques.

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. A. Kessler, A. Agrawal, G. Jander, and J. S. Thaler.
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 ANTH 3114)
Fall. 3 credits. Limited to 18 students. Prerequisite: one year introductory biology or ANTHR 1300 or permission of instructor. Letter grades only. Occasional field trips.
K. A. R. Kennedy.
Broad survey of the fossil evidence for human evolution with special attention to skeletal and dental anatomy, geological contexts, paleoecology, dating methods, archaeological associations, and current theories of human origins and physical diversity.

[BIOEE 3720 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 $1,200. Offered alternate years; offered 2009–2010. C. D. Harvell.)

[BIOEE 4050 Biology of the Neotropics]
Spring. 2 credits. Limited to 18 students. Prerequisite: BIOEE 2610 or permission of instructor. S-U or letter grades. Next offered 2009–2010. A. S. Flecker.

[BIOEE 4460 Plant Behavior—Induced Plant Responses to Biotic Stresses]
Spring. 3 credits. Limited to 12 students. Prerequisite: BIOEE 2610 or permission of instructor. S-U or letter grades. Next offered 2009–2010. A. Kessler.
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 4500 Mammalogy, Lectures  
Spring. 3 credits. Recommended. BIOEE 2740. Letter grades; S-U grades by permission only. Offered alternate years. B. A. McGuire. 
Lectures cover the evolution, diversity, functional morphology, behavior, ecology, and biogeography of living mammals. Selective coverage of mammalian fossils, conservation status, domestication, and diseases.

BIOEE 4501 Mammalogy, Laboratory  
Spring. 1 credit. Limited to 16 students. Pre- or corequisite: BIOEE 4500. Letter grades; S-U grades by permission only. 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. B. A. McGuire. 
Laboratory topics include systemsatics, morphology, reproductive biology, locomotion, and behavior. Focus is on terrestrial mammals of North America. Most laboratories involve studies of skeletons and museum specimens; dissection of preserved material is possible. Live animals may be studied in the field and used in the laboratory for nondestructive experiments and demonstrations.

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. R. G. Harrison. 
Advanced course in evolutionary biology focusing on the pattern and process of speciation and the nature and origin of intrinsic barriers to gene exchange. Lecture topics include species concepts and definitions, the history of ideas about speciation, the biological basis of intrinsic barriers to gene exchange, current models for the origin of such barriers, genetic architecture of speciation, rates of speciation. Emphasis is on developing a rigorous conceptual framework for discussing speciation and on detailed analysis of a series of case histories.

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. J. S. Thaler. 
For description, see ENTOM 4550.

[BIOEE 4560 Stream Ecology (also NTRES 4560)]  
Fall. 4 credits. Limited to 40 students. Prerequisite: BIOEE 2610 or permission of instructor. S-U or letter grades. Field project with lab papers. One Sat. field trip. Offered alternate years; next offered 2009–2010. 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 only. Offered alternate years; next offered 2009–2010. N. G. Hairston, Jr.

[BIOEE 4571 Limnology: Ecology of Lakes, Laboratory]  
Spring. 2 credits. Pre- or corequisite: BIOEE 4570. Letter grades; S-U grades by permission only. One weekend field trip. Fee for food on field trip: $15. Offered alternate years; next offered 2009–2010. N. G. Hairston, Jr. and staff.

[BIOEE 4580 Community Ecology]  
Spring. 4 credits. Prerequisites: BIOEE 2610, 2780, or permission of instructor. S-U or letter grades. Offered alternate years; next offered 2009–2010. M. A. Geber and A. Agrawal.

[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, BION 4220) or permission of instructor. S-U or letter grades. Offered alternate years. S. P. Ellner. 
Introduction to the models used to construct ecological theory and analyze data on ecological dynamics, and to the mathematical and computer methods used to analyze these models. Applications from individual decision-making through multiplex and spatial dynamics introduce the main themes in theoretical ecology: optimization, dynamics, and the links between process and pattern. The lab includes instruction in computer programming and review of mathematical methods.

BIOEE 4620 Marine Ecology (also EAS 4620)  
Fall. 3 credits. Limited to 75 students. Prerequisite: BIOEE 2610. Letter grades; S-U grades by permission only. Offered alternate years. C. D. Harvell and C. H. Greene. 
Lectures and discussion focus on current research in broad areas of marine ecology with an emphasis on processes unique to marine systems. A synthetic treatment of multiple levels of organization in marine systems including organismal, population, community, ecosystems, and evolutionary biology. Examples are drawn from all types of marine habitats, especially polar seas, temperate coastal waters, and tropical coral reefs.

[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 only. Offered alternate years; next offered 2009–2010. A. R. McCune. 

[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 only. Offered alternate years. J. P. Sparks. 
Detailed survey of the physiological approaches used to understand the relationships between plants and their environment. Lectures explore physiological adaptation; limiting factors; resource acquisition and allocation; photosynthesis, carbon, and energy balance; water use and water relations; nutrient relations; linking physiology, development, and morphology; stress physiology, life history and physiology; the evolution of physiological performance; and physiology at the population, community, and ecosystem levels. Readings draw from the primary literature and textbooks.

BIOEE 4661 Physiological Plant Ecology, Laboratory  
Spring. 2 credits. Limited to 15 students. Pre- or corequisite: BIOEE 4660. Letter grades only. Offered alternate years. J. P. Sparks. 
Detailed survey of the physiological approaches used in understanding the relationships between plants and their environment. Laboratories apply physiological techniques to specific ecological problems and cover topics such as sign and computer-aided data analysis. Most laboratories run past the three-hour period, with students spending an average of three hours per week in additional lab time for this course.

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 only. Offered alternate years. H. W. Greene. 
Lectures cover various aspects of the biology of amphibians and reptiles, including evolution, zoogeography, ecology, behavior, and physiology.

BIOEE 4701 Herpetology, Laboratory  
Spring. 2 credits. Limited to 35 students. Pre- or corequisite: BIOEE 4700. Letter grades; S-U grades by permission only. Fee: $30. Occasional field trips and special projects. Offered alternate years. H. W. Greene. 
Laboratory topics include systematics, morphology, and behavior. Live animals are studied in the field and are used in the laboratory for nondestructive demonstrations and experiments. The systematics laboratory exercises are based on museum specimens and dissection of preserved materials.

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. L. E. Drinkwater. 
Analysis of the ecological processes operating in agricultural systems, with an emphasis on understanding relationships between agroecosystem structure and function and interactions among organisms. Examines agroecological theory and research through readings and discussions. The first part of this
course emphasizes understanding biogeochemical processes, population and community ecology with emphasis on plant-herbivore and plant-microbial interactions, and evolutionary processes in agroecosystems. The latter part focuses on the application of ecological knowledge to design and management of multifunctional agroecosystems. Field trips to local farms and case studies from both the tropics and the temperate zone are used to illustrate important concepts.

**[BIOEE 4750 Ornithology](#)**


**[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 only. Small lab fee may be required. Two field trips. Offered alternate years. A. R. McCauley.

Introduction to the study of fishes: their structure, physiology and functional morphology, behavior, ecology, diversity, evolution, classification, and identification. Emphasizes marine fishes from different habitats (temperate, tropical coral reef, intertidal, and deep sea); local freshwater species; and interesting freshwater fishes from around the world, especially South America and Africa. Two field trips, including one full-day weekend trip required. Live animals are studied in the field and are sometimes used in the laboratory for nondestructive demonstrations or experiments. The systematics and dissection laboratories use preserved specimens.

**[BIOEE 4770 Marine Invertebrates Seminar](#)**

Fall. 1 credit. Prerequisite: BIOEE 3750 or permission of instructor. S-U grades only. Offered alternate years; next offered 2009–2010. C. D. Harvell and J. G. Morin.

**[BIOEE 4780 Ecosystem Biology](#)**

Spring. 4 credits. Prerequisite: BIOEE 2610 or equivalent. S-U or letter grades. Offered alternate years. C. L. Goodale and staff.

Analyzes ecosystems in terms of energy flow and nutrient cycles, emphasizing an experimental approach and comparative aspects of terrestrial, freshwater, and marine ecosystems. Considers anthropogenic effects on ecosystems, such as from acid precipitation and nitrogen pollution. Also analyzes climate change and regional environmental change from an ecosystem perspective.

**[BIOEE 4790 Paleobiology (also EAS 4790)](#)**

Spring. 4 credits. Prerequisites: one year introductory biology for majors and either BIOEE 2740, 3730, 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. 3 credits. Prerequisite: BIOEE 2780. Recommended: introductory course in genetics and/or statistics. S-U or letter grades. 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 and M. J. Shulman.

Seminars on courses selected 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 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.

**[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 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, intersession, 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. C. D. Harvell, J. P. Sparks, and N. G. Hairston, Jr.

Field trip to the big island of Hawaii, the Yucatan Coast of Mexico, or similar environment; credit with instructors for planned location. Students employ experimental approaches to study ecological and evolutionary questions across a range of tropical biomes.

**[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; next offered 2009–2010. J. P. Sparks.

**[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; next offered 2009–2010. R. W. Howarth and C. L. Goodale.

**[BIOEE 6710 Palaeoanthropology of South Asia (also ANTHR 6371, ASIAN 6671)](#)**


**[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 2009–2010. 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 2009–2010. 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 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. R. G. Harrison and S. M. Bogdanowicz.

---


---

Thus far, every study has been published.
Construct and screen genomic DNA libraries for microsatellite loci. Lectures and group discussions regarding microsatellite isolation, characterization, and evolution. Informal presentations of student research projects.

**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, biocorrolence, 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. P. P. Feeny. 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. J. J. Lovette, A. A. Dhome, 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&EB 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)

**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. Lect. J. Blankenship.
For description, see BIOBM 1320.

**BIOGD 2800 Lectures in Genetics**
Fall, spring, or summer (eight-week session). 5 credits. Not open to freshmen fall semester. Prerequisite: one year introductory biology or equivalent. Lect, lab. Highly recommended: problem-solving sessions. T. D. Fox, R. J. MacIntyre, 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. Lect. Highly recommended: problem-solving sessions. T. D. Fox, R. J. MacIntyre, 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. Lect. M. L. Goldberg. 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.

**GENETICS AND DEVELOPMENT (BIOGD)**

**Evolution of the Earth and Life (BIOG 1700, EAS 1102)**

**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)**

**Animal Social Behavior (BIONB 4270)**

**Introductory Botany (BIOL 2410)**

**Taxonomy of Vascular Plants (BIOL 2480)**

**Phylogenetic Systematics (BIOL/ENTOM 4400)**

**Molecular Systematics (BIOL 4470)**

**Plant Evolution and the Fossil Record (BIOL 4480)**

**Principles and Practice of Historical Biogeography (BIOL/ENTOM 4530)**

**Field Ornithology (BIOSM 3740)**

**Field Marine Biology and Ecology (FMBE) (BIOSM 3750)**

**Seaweeds, Plankton, and Seagrass: The Ecology and Systematics of Marine Plants (BIOSM 4490)**

**Biological Statistics I (BTRY/STBTRY 3010, NTRES 3130)**

**Statistical Genomics (BTRY/STBTRY 4820)**

**Statistical Analysis of Qualitative 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 3290)**

**Methods in Animal Behavior (BIONB 3230)**

**Neurobiology and Behavior I: Introduction to Behavior (BIONB 2210)**

**Methods in Animal Behavior (BIONB 3230)**

**Insect Behavior (BIONB 3250)**

**Ecology of Animal Behavior (BIONB/BIOSM 3290)**

**Modeling Behavioral Evolution (BIONB 4220)**

**Animal Communication (BIONB 4260)**

**Animal Social Behavior (BIONB 4270)**

**Introductory Botany (BIOL 2410)**

**Taxonomy of Vascular Plants (BIOL 2480)**

**Phylogenetic Systematics (BIOL/ENTOM 4400)**

**Molecular Systematics (BIOL 4470)**

**Plant Evolution and the Fossil Record (BIOL 4480)**

**Principles and Practice of Historical Biogeography (BIOL/ENTOM 4530)**

**Field Ornithology (BIOSM 3740)**

**Field Marine Biology and Ecology (FMBE) (BIOSM 3750)**

**Seaweeds, Plankton, and Seagrass: The Ecology and Systematics of Marine Plants (BIOSM 4490)**

**Biological Statistics I (BTRY/STBTRY 3010, NTRES 3130)**

**Statistical Genomics (BTRY/STBTRY 4820)**

**Statistical Analysis of Qualitative 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 and Management, Lec/Lab (NTRES 4220/4221)**

**Fungi (PLPA 3090)**
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 BIOMI/BIOBM 3940)
Fall, 2–3 credits. Prerequisite: ENTM 2120 or BIOB 2810 or BIOB 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 BIOB 3510 or BIOB 3520 or BIOBM 3530) and permission of instructor. Lec. Letter grades. M. Inada.
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.

BIOGD 4000 Genomics
Fall. 3 credits. Prerequisites: one year introductory biology plus BIOGD 2810 or 3300 or 3350 or 3510/3520 or permission of instructor. S-U or letter grades. Lec. W. Liu.
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. Prerequisites: 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 BIOB 3500 or 3510/3520. Recommended: BIOGD 2810 and BIOBM 4520. 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., BIOB 3500, 3330/3320, or 3350) and genetics (e.g., BIOGD 2810) or permission of instructor. Recommended: cell biology (e.g., BIOBM 4520 or BIOAP 3160) and physiology (e.g., BIOAP 3110 or 4580). S-U or letter grades. Lec. K. Lee.
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 4400 Stem Cell Biology: Basic Science and Clinical Applications
Spring. 3 credits. Limited to 30 students. Prerequisites: BIOGD 4520 or BIOGD 3850 or permission of instructor. S-U; grades by permission of instructor. Lec. T. Tumbar.
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 4520 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, BIOB 3330 or 3300 or 3350. Recommended: BIOGD 3850. Lec. Offered alternate years. M. Wolfnner.
This course explores the molecular and genetic pathways and mechanisms that regulate animal development, and how they are modified through evolution to result in the dazzling array of forms and functions seen in the animal kingdom.

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 and 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, 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; priority given to seniors studying genetics and molecular and cellular biology; BIOGD 2810 and BIOB 3300 or 3350 or 3510 and 3320. M. Inada.
Presentation of some of the 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, eugenics, genetic counseling, genetic screening (pre-implantation, prenatal, neonatal, pre-symptomatic, carrier, and workplace), wrongful life and wrongful birth, genetic effects of abused substances, genetics and behavior, human cloning, forensic uses of genetics, and therapy for genetic diseases. Students lead some discussions. There is a major writing component to the course.

BIOGD 4825 Molecular Biology of Plant Organelles (also BIOL 4825)
Spring. 1 credit. Prerequisites: BIOL 4831 or BIOGD 2810 and permission of instructor. S-U or letter grades. M. R. Hanson and D. B. Stern.
For description, see BIOL 4825.

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 development 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 BIOMI/BIOBM 4850)
Fall or spring. 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 3500 or 3510 and 3520 or 3330. J. E. Peters.
For description, see BIOMI 4850.
BIOGD 4860 Eukaryotic Genetics
Spring. 4 credits. Enrollment may be limited to 50 students. Prerequisites: BIOGD 2810, BIOBM 3300 or 3530 or 3510 and 3520. S-U or letter grades. E. E. Adler. Develops 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 organization. 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 the whole genome knowledge in expediting this process of gene discovery. Stresses the role of statistical inference in interpreting genomic information. Focuses on the central role of understanding variation in the human genome in mediating variation in disease risk, are explored in depth. Methods such as homologous recombination, 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 4890)
Spring. 3 credits. Prerequisite: introductory biology. Offered alternate years; next offered 2009–2010. 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. 2 credits. Course meets during first half of semester (R 1.25–3.20; Aug. 25–Oct. 4) and provides background information for VTBIM 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 3530 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 6080 Epigenetics (also NS 6080)
Fall. 2 credits. Prerequisites: BIOGD 2810 and BIOBM 3300, 3530, or 3510 or NS 3200. Letter grades only. Planned W F 11:15–12:15; 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 3500 or 3530 or 3510/352 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 chromosomes 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 (also NS 6110)
Fall. 1 credit. Meets only during second half of semester beginning Oct. 15. Limited to 25 students. Prerequisites: BIOGD 2810, as well as BIOBM 3300, or 3530, or 3510/352 (or equivalents). S-U or letter grades. Next offered 2009–2010. 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; next offered 2009–2010. 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 biologic insights derived from genomic analysis. Technical, scientific, ethical, political, 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 animal 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. S-U or letter grades. Prerequisite: BIOGD 2810 or equivalent, or permission of instructor. Lec. Offered alternate years. B. G. Turgeon. For description, see PLPA 6380.

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. 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, or 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 or 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, by permission of instructor. Seminar TBA. 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 7820–7830 Current Genetics/Development Topics  
Spring, 0.5 or 1 credit for each topic; may be repeated for credit. S-U grades only. Lect and sem on specialized topics. Staff.

BIOGD 7840 Introduction to Quantitative Analysis  
Fall. 1 credit. Letter grades only. E. Alani (organizer), A. Clark, C. Bustamante, and M. 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.

BIOGD 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 3470)
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)

BIOMI 1720 Bioscientific Terminology  
Summer and winter. 3 credits. Letter grades only.

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. Some material may overlap with BIOGD 2810 and BIOBM 3300. Also covers applied aspects of microbiology such as biotechnology, the role of microorganisms in environmental processes, and medical microbiology. 4-credit option: Interested students complete four modules that last three weeks each: (1) environmental microbiology, (2) pathogenic microbiology, (3) genetics, and (4) structure and function. Students are encouraged to take this course during their third year of study.

BIOMI 2940 Applied and Food Microbiology (also FDSC 3940)  
Fall. 2–3 credits. Prerequisites: BIOMI 2900, 2910, and BIOMI 3300 or 3310 or 3330. Priority given to biological sciences students in microbiology program of study. W. C. Ghiorse, J. P. Shapleigh, and S. H. Zinder. Illustrates basic principles of experimental microbiology. The course is organized into four modules that last three weeks each: (1) ecology, (2) physiology, (3) genetics, and (4) structure and function. Students are encouraged to take this course during their third year of study.

BIOMI 3970 Environmental Microbiology  
Fall. 3 credits. Prerequisites: BIOMI 2900 or 2910 or BIOMI 3300 or permission of instructor. Offered alternate odd-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 and Mycology (also VETMI 4040)  
Spring. 2 or 3 credits; 3 credits with lec and sem. Prerequisites: BIOMI 2900 and 2910; for undergraduates, permission of instructor. Highly recommended: BIOMI 3050. Offered alternate even years. D. Debbie. For description, see VETMI 4040.

BIOMI 4090 Principles of Virology (also VETMI/PLPA 4090)  
Fall. 3 credits. Prerequisites: BIOMI 2900, 2910 or permission of instructor. Recommended: BIOMI 3300–3320, 4320. Letter grades only. G. R. Whittaker and S. G. Lazarowitz. For description, see VETMI 4090.
BIOMI 4140 Prokaryotic Diversity
Spring. 3 credits. Prerequisites: BIOM 2900 and 2910. Recommended: BIOM 3300 or 3310 or 3330. Offered alternate odd-numbered years. S. H. Zinder.

Consideration of prokaryotic 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, fixations of carbon and nitrogen, and adaptation to extreme environments.

BIOMI 4160 Bacterial Physiology
Spring. 3 credits. Prerequisites: BIOM 2900, 2910, and BIOM 3300 or 3310, or equivalents. Offered alternate even years; next offered 2009–2010. J. P. Shapleigh.

Focuses on physiological and metabolic functions of bacteria. Consideration is given to chemical structure, regulation, growth, and energy metabolism. Special attention is given to those aspects of bacterial metabolism not normally studied in biochemistry courses.

BIOMI 4180 Microbial Ecology
Spring. 3 credits. Prerequisites: BIOM 2900 and 2910, or 3370 and permission of instructor, and BIOM 3300 or 3310 and 3320. R. E. Angert.

Understanding the role of microorganisms in natural environments is one of the greatest challenges facing microbiologists. This course introduces current biochemical and macromolecule sequence-based methods to assess community diversity and microbial activity in a variety of ecosystems. Other topics discussed include bacterial growth and survival, population biology, and microbial interactions.

BIOMI 4200 Microbial Genomics
Spring. 2 credits. Prerequisites: BIOM 2900, BIOMG 2810, BIOM 3500, or equivalent. Offered alternate odd-numbered years. 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 VETMI 4310)
Fall. 2 credits. Prerequisites: zoology and biology courses. D. Bowman.

For description, see VETMI 4310.

BIOMI 4480 Symbiotic Associations: Evolution and Ecology (also PLPA 4480)
Spring. 3 credits. Prerequisites: two semesters of introductory biology (BIOG 1101–1102, BIOL 1105–1106, BIOL 1107–1108, or BIOL 1109–1110), and BIOM 2900 or permission of instructor. Letter grades only. T. E. Pawlowska.

For description, see PLPA 4480.

BIOMI 4650 Bacterial Genetics (also BIOG/BIOM 4850)
Fall. 2 or 3 credits; optional 1 credit for registered students with permission of instructor to review literature. Prerequisite: BIOM 2800 or BIOM 3300 and 3310 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 positive and negative 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 4680 Genomics of Bacterium-Host Interactions (also PLPA 4680)
Fall, second half of semester. 1 credit. Prerequisites: BIOM 2900 or equivalent or permission of instructor. Letter grades only. A. Collmer and S. Winans.

For description, see PLPA 4680.

BIOMI 6100 Introduction to Chemical and Environmental Toxicology (also TOX 6100)
Fall. 5 credits. Prerequisite: graduate standing in field or permission of instructor. Letter grades only. A. Hay.

Introduction to the general principles of toxicology including the sources, mechanisms, and targets of toxins. 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, chromosome 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 role of both specific and non-specific 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; BIOM 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. Sec 01 Bacterial Genetics, S. C. Winans; Sec 02 Environmental Microbiology, 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 7050)
Advanced Work in Bacteriology, Virology, or Immunology (VETMI 7070)
Phytobacteriology Research Updates (PLPA 6470)
Basic Immunology, Lectures (BIOG 3050, VETMI 3150)
Current Topics in Oomycete Biology (PLPA 6440)
Food Microbiology, Laboratory (FDSC 3950)
Food Microbiology, Lectures (FDSC 3940)
Immunology of Infectious Diseases (VETMI 7190)
Introduction to Scanning Electron Microscopy (BIOG 4010)
Fungi (PLPA 3090)
Light and Video Microscopy for Biologists (BIOG 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)

**NEUROBIOLOGY AND BEHAVIOR (BIOMI)**

**BIOMI 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.

**BIOMI 1220 FWS: Special Topics in Neurobiology and Behavior**

**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 2210 Neurobiology and Behavior I: Introduction to Behavior**
Fall. 3, 4, or 5 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 BIOMI 2220. S-U or letter grades. Planned M W F 12:20; disc TBA. R. A. Raguso 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.

**BIOMI 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 11:15. E. Adkins-Regan. Graduate seminar for students majoring in neuroscience, zoology, or psychology. Some discussion sections include invertebrate vision.

**BIOMI 2220 Neurobiology and Behavior II: Introduction to Neurobiology**
Spring. 3 or 4 credits; 4 credits with disc and written projects; 4-credit option required of students studying neurobiology and behavior. Limited to 15 students per disc; priority given to students studying neurobiology and behavior. Not open to freshmen. Prerequisites: one year introductory biology for majors and one year of chemistry. May be taken independently of BIOMI 2210. S-U or letter grades. Planned M W F 12:20; disc TBA. J. R. Fetcho and 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.

**BIOMI 3210 State of the Planet**
Spring. 3 credits. Prerequisites: none. S-U grades only. Planned M W F 1:25–2:15. T. Eisner, M. L. Zeeman, and D. P. McCobb. This interdisciplinary course is intended for any student with concern for the global crises we collectively face. During this course you will be introduced to current data and engaged in analysis of those data, establish a global context for your specialized education, and be provided with a toolbox to bring awareness, analysis and action to your lives and careers beyond graduation.

**BIOMI 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 2240 or BIOMI 2210 or 2220 or one year introductory biology plus psychology course. Two less 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. E. Adkins-Regan. For description, see PSYCH 3220.

**BIOMI 3230 Methods in Animal Behavior**
Fall. 4 credits. Limited to 24 students. Prerequisite: BIOMI 2210. Letter grades only. Offered alternate years; next offered 2009–2010. 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/marking methods, and behavioral statistics.

**BIOMI 3240 Biopsychology Laboratory (also PSYCH 3240)**
Fall. 4 credits. Limited to 20 students. Prerequisites: junior or senior standing; PSYCH 2240 or BIOMI 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.

**BIOMI 3250 Insect Behavior (also ENTOM 3250)**
Spring. 3 credits. Limited to 50 students. Prerequisite: ENTOM 2120 or BIOMI 2210. Intended for juniors, seniors, and beginning graduate students. S-U or letter grades. Planned T R 10:10–11:25. Offered alternate years. L. S. Rayor. For description, see ENTOM 3250.

**BIOMI 3260 The Visual System**
Spring. 4 credits. Limited to 25 students. Prerequisite: BIOMI 2220 or BIOP 3110 or permission of instructor. S-U or letter grades. Planned M W 10:10–11:25. Offered alternate years; next offered 2009–2010. H. C. Howland. The visual systems of vertebrates are discussed in breadth and depth as well as some aspects of invertebrate vision.

**BIOMI 3290 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 BIOMI 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.

**BIOMI 3320 Ecology of Animal Behavior (also BIOISM 3290)**
Summer. 4 credits. Limited to 18 students. Prerequisite: one year introductory college biology. Recommended: ecology, psychology, or behavior course. S-U or
BIONB 3300 Introduction to Computational Neuroscience (also PSYCH/COGST/BME 3300)
Fall. 3 or 4 credits. Prerequisites include lab TBA, permission of instructor, or computer simulation exercises. Limited to 25 students. Prerequisite: BIONB 2220 or permission of instructor. S-U or letter grades. Offered alternate years. Planned M W 2:55–4:10. Lab TBA. C. Linster.

BIONB 3310 Human Sociobiology
Spring. 3 credits. Limited to 100 students. Prerequisite: BIONB 2210 or PSYCH 2230 or permission of instructor. S-U or letter grades. Offered alternate years. Planned M W 9:05–10:10. P. Barclay.

BIONB 3360 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. Offered alternate years; next offered 2009–2010. K. Adler.

BIONB 3390 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; next offered 2009–2010. R. M. Harris-Warrick.

BIONB 3390 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. Offered alternate years; next offered 2009–2010. A. Agrawal, G. Jander, A. Kessler, and J. Thaler.

BIONB 3900 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; next offered 2009–2010. R. M. Harris-Warrick.

BIONB 3940 Circadian Rhythms (also BIOG/ENTOM/PLPA 3940)
Fall. 2 or 3 credits (for optional lab sec see PLPA 3941). Prerequisite: 200-level biology course. S-U or letter grades. Planned T R 10:10–11:25, sess lab R 1:25–4:25 for 3-credit option. K. Lee.

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 2009–2010. B. P. Haldern.

BIONB 4130 Molecules of Social Behavior and Emotion

BIONB 4200 Topics in Neurobiology and Behavior
Fall or spring. Variable credit; may be repeated for credit. Primarily for undergraduates. S-U or letter grades. Staff.

BIONB 4205 Topics in Neurobiology and Behavior: Darwinian Medicine Seminar
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. We consider evolutionary explanations for such phenomena as normal (healthy) and diseased body reactions in pregnancy, why we are sometimes vulnerable to obesity, why we are especially vulnerable to infectious diseases, why cultures respond differently to diseases, what evolutionary forces have molded our reproductive systems, why we exhibit allergies and cancer, mental diseases, and how and why we age. This course seeks to provide both pre-med and non-premed students with a Darwinian methodology for understanding health and disease. Premed students will undoubtedly eventually find it useful in their practices, and all will find the logical and broad practical in their everyday lives. A lecture is given on each topic, followed by interactive, student-led discussions where students are given an opportunity to research the topic of their choosing. Grades are based on class participation, short written summaries of each topical area, and a PowerPoint presentation of a self-selected topic.

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 website. Limited to 35 students. Prerequisites: introductory course in biology or psychology, plus second course in perception, neuroscience, cognitive science, or biopsychology. Planned T R 10:10–11:25. B. P. Halpenny.

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; next offered 2009–2010. H. K. Reeve.

BIONB 4230 Cognitive Neuroscience (also PSYCH 4250/6250)
Fall. 4 credits. Limited to 20 students. Prerequisites: introductory biology; biopsychology or neuroscience (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. B. L. Finlay.

BIONB 4240 Neuroethology (also PSYCH 4240)
Fall. 4 credits. Limited to 50 students. Prerequisites: BIONB 2210 and 2220; or permission of instructor. S-U or letter grades. Offered alternate years; next offered 2009–2010. C. D. Hopkins.
A comparative approach to the study of neural circuits involved in animal behavior: echolocation, sound localization, communication and signal recognition, bird song, central pattern generators, command neurons, and other topics.

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; next offered 2009–2010. D. P. McCobb.
Structure/function of ion channels responsible for electrical signals in, e.g., learning/memory, sensing heat and jalapenos, epilepsy, directional plant growth.

BIONB 4260 Animal Communication
How and why do animals communicate (topics include signal evolution, environmental effects on communication, cooperation vs. conflict signals, signal honesty, interspecific communication).
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. P. W. Sherman. Writing-intensive advanced course for upper-division students interested in Darwinian medicine. Lectures, discussions, and student presentations examine topics including adaptation, intragenomic conflict, evolution of infectious disease, genetic diseases, virulence, sexuality, neuroendocrinology, stress, diet and disease, allergy, fever, morning sickness, lactose intolerance, depression and other mental illnesses, cancer, menopause, and senescence.

BIONB 4280 Clinical Neurobiology
Fall. 5 credits. Limited to 20 students. Prerequisites: two courses from BIONB 2220, BIOGD 2810, BIOMB 3500 or 3510; 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. R. Booker. The goal of this course is to provide students with an appreciation of the current challenges facing the study and treatment of neurodegenerative diseases. The focus is on the etiology, epidemiology, cellular and molecular basis, and strategies for treating a number of neurodegenerative diseases, including but not limited to Alzheimer’s disease, Parkinson’s disease, neural ischemia, depression, ADHD, eating disorders, and AIDS-related dementia. The course provides a health context that enriches the student’s learning experience in other advanced courses in the biological sciences. Guest speakers include faculty members from across the Ithaca campus and the Weill College of Medicine, Departments of Neurology and Neurosciences.

[BIONB 4290 Olfaction and Taste: Structure and Function (also PSYCH 4200)]
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 100-level course in biophysics or equivalent. Planned T R 10:10–11:25. Offered alternate years; next offered 2009–2010. B. P. Halpern. For description, see PSYCH 4290.

BIONB 4300 Experimental Molecular Neurobiology
Spring. 4 credits. Limited to 12 students. Prerequisites: BIOMB 3500 or 3510. Recommended: BIOGD 2810. Letter grades only. Lab T (for times see www.nnb. cornell.edu/Faculty/deitcher/BioNB_430.html). Offered alternate years. D. L. Deitcher. Experiments include PCR, cloning of DNA fragments, RNA purification, restriction digests, bacterial transformation, DNA sequencing, and protein interactions. Experiments emphasize how molecular techniques can be applied to studying neurological problems.

[BIONB 4310 Genes and 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. K. Shaffer. 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. Course material assists an integration of molecular genetic, population genetic and phylogenetic perspectives, emphasizing the animal diversity found in natural systems. Topics include the evolution of feeding, sexual, parental, social and predator-prey behaviors. Part lecture, part discussion with active-learning component.

BIONB 4440 Neural Computation (also PSYCH 4440)
Spring. 3 credits; limited to 10 students. Prerequisite: BIONB 2220 or permission of instructor. S-U or letter grades. Planned T R 2:30–3:20, lab T R 3:35–4:25. Offered alternate years. T. A. Cleland. For description, see PSYCH 4440.

[BIONB 4460/4461 Plant Behavior—Induced Plant Responses to Biotic Stresses]
BIONB 4700 Biophysical Methods (also AE/EN 4670)
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 4900 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 12:30–2:25. R. T. 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 instruct1.cit.cornell.edu/courses/bionb/4901/index.html.

BIONB 4920 Sensory Function (also PSYCH 4920/6920)
Spring. 4 credits. Limited to 25 students. Prerequisite: 3000-level course in biophysics, 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. H. C. Howland and 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; next offered 2009–2010. R. Booker. Focuses on both the morphological and molecular basis of neurodevelopment. Assigned readings are taken from original journal and review articles.

BIONB 4940 Brain Evolution and Behavior
Spring. 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 2009–2010. A. H. Bass. Organization and evolution of neuroanatomical pathways as substrates for species-typical vertebrate behaviors.

BIONB 4950 Molecular and Genetic Approaches to Neurobiology
Fall. 5 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. D. L. Deitcher. Focuses on how different molecular and genetic approaches have led to major advances in neuroscience. Lectures, student presentations, and discussions examine original research articles. Topics include ligand-gated channels, potassium channels, seven membrane spanning receptors, development of the neuromuscular junction, neurotransmitter release, second messengers, learning and memory, and neurodiseases.

BIONB 4960 Bioacoustic Signals in Animals and Man
Fall. 4 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 TBA. Offered alternate years; next offered 2009–2010. C. W. Clark and R. R. Hoy. Teaches students about animal acoustic signaling by introducing them to various animal acoustic systems.

BIONB 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.
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)

PLANT BIOLOGY (BIOPL)

BIOPL 1120 Issues in Social Biology: from Diet to Diseases, DNA to Defrauds
Fall and spring. 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 2400 Green World/Blue Planet
Fall. 3 credits. S-U or letter grades. Lect. 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. Lect. 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 2440. 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 4340)
Fall. 4 credits. Prerequisite: one year introductory biology or written permission of instructor. May not be taken for credit after BIOPL 2480. Lect. Lab. Offered alternate years. 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.

**BIOL 2450 Plant Biology**  
Summer, six-week session. 3 credits.  
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.

**BIOL 2470 Ethnobiology**

**BIOL 2480 Taxonomy of Vascular Plants**  
Spring, 4 credits. Prerequisite: one year introductory biology. May not be taken for credit after BIOL 2430. S-U or letter grades. Lec. Lab. Offered alternate years; next offered 2009–2010. 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.

**BIOL 3420 Plant Physiology, Lectures**  
Spring, 3 credits. Prerequisites: one year introductory biology. Corequisite: BIOL 3440 or written permission of instructor. May not be taken for credit after BIOL 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.

**BIOL 3421 Plant Physiology, Laboratory**  
Spring, 2 credits. Corequisite: BIOL 3420.  
May not be taken for credit after BIOL 2440. Similar to BIOL 2440 but at more advanced level. Lab, disc. T. Silva.  
Experiments exemplify concepts covered in BIOL 3420 and offer experience in a variety of biochemical and biological techniques, from the cellular to whole plant level, with emphasis on experimental design.

**BIOL 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.

**BIOL 3431 Laboratory in Molecular Biology and Genetic Engineering of Plants**  
Spring, 2 credits. Limited to 24 students. Prerequisite: BIOL 3430 or permission of instructor. Recommended: concurrent enrollment in BIOL 3430. S-U or letter grades. Lab, M. E. Nasrallah.  
Companion to BIOL 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.

**BIOL 3450 Plant Anatomy**  
Fall, 4 credits. Limited to 15 students. Prerequisite: one year introductory biology or a semester of botany. Lec, lab. Next offered 2009–2010. 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 practical skills required to make anatomical diagnoses and to write anatomical descriptions.

**BIOL 3480 The Healing Forest**  
Spring, 2 credits. Prerequisites: introductory biology or plant biology or permission of instructor. Lec/disc. Offered alternate years. Staff.

**BIOL 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. J. I. Davis.  
Systematics and related aspects of the biology of the graminoid plants (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.

**BIOL 3600 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.

**BIOL 4010 Introduction to Scanning Electron Microscopy**

**BIOL 4030 Transmission Electron Microscopy for Biologists**

**BIOL 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.

**BIOL 4220 Plant Development**  
Fall. 2 credits. Lec. Prerequisites: course work in molecular biology (e.g., BIOMB 3500, 3510/3520, or 3350), 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.

**BIOL 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. 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.

**BIOL 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.

**BIOL 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.

**BIOL 4440 Plant Cell Biology**  
Fall. 4 credits. Limited to 24 students. Prerequisites: one year introductory biology or permission of instructor. Lec, labs. 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 mobility, the interaction of the cell with its environment, and the processes that give rise to multicellular differentiated plants are investigated.

**BIOL 4470 Molecular Systematics**  
Fall. 3 credits. Prerequisites: BIOEE 2780 or BIOL 2810 or BIOMB 3300, or BIOMB 3320 or written permission of instructor. Lec. Offered alternate years; next offered 2009–2010. 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 organelle 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. Niday 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; next offered 2009–2010. P. J. Davies. Study of plant hormones and how they regulate plant growth and development. Topics include production, physiology, 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. Emphasis is on 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 instructor. S-U or letter grades. Lec, lab. Offered alternate years: next offered 2009–2010. 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 3500 or 3510 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] Molecular Plant-Pathogen Interactions I and II (also PLPA 4821)**

Spring. 1 credit. 12 lec. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3520, or equivalents. Recommended: BIOB 3130. 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 BIOE 4640, PLPA 4822)**

Spring. 1 credit. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3520, or equivalents. Recommended: BIOB 3130. S-U or letter grades. 12 lec. Offered alternate years; next offered 2009–2010. S. C. Winans. Focuses on the interactions of Agrobacteria and Rhizobias 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 Rhizobias-plant interactions include regulation of nitrogenase activity and expression, organization and function of the syn 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 3520, or equivalents. Recommended: BIOB 3130. Offered alternate years. 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: BIOGD 2810 and BIOBM 3300 or 3520, or equivalents. Recommended: BIOB 3130. S-U or letter grades. Offered alternate years. R. Turgenev. At some point, most research projects involve structural analysis. This may necessitate hand sectioning, in situ hybridization, electron microscopy, confocal imaging, or any of a host of other possibilities. The key to success is having a proper foundation so that the correct choice of procedures can be made. This course provides an overview of the theory of practical light and electron microscopy focusing on plant tissue preparation, hand and microtome sectioning, staining, optical techniques, histochemistry, and the localization of macromolecules. Students will gain an appreciation of the potentials and limitations of available methods and learn how these methods can be combined to answer specific research questions. The course will consist of six lectures and four two-hour labs, plus a short project.

**[BIOPL 4826] Plant Biotechnology (also PLBR 4826)**

Spring. 1 credit. 12 lec. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3520, or equivalents. Recommended: BIOB 3130. S-U or letter grades. Offered alternate years. R. Turgenev. Dealing 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. 12 lec. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3520, or equivalents. Recommended: BIOB 3130. S-U or letter grades. 12 lec. Offered alternate years; next offered 2009–2010. 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 basic to proteomics.

**[BIOPL 4828] Plant Imaging**

Spring. 1 credit. 4 weeks. Limited to 12 students. Priority given to graduate students. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3520, or equivalents. Recommended: BIOB 3130. S-U or letter grades. Offered alternate years. R. Turgenev. This course provides an overview of the theory of practical light and electron microscopy focusing on plant tissue preparation, hand and microtome sectioning, staining, optical techniques, histochemistry, and the localization of macromolecules. Students will gain an appreciation of the potentials and limitations of available methods and learn how these methods can be combined to answer specific research questions. The course will consist of six lectures and four two-hour labs, plus a short project.
**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, next offered 2009–2010. 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 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/PLBR 4831)**
Fall. 2 credits. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. Lec. S-U or letter grades. S. R. McCouch, J. Giovannoni, and J. Rose.

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) series. The course is divided into three sections: (1) Gene discovery: covers genetic, molecular, and genomic approaches to the isolation of plant genes; (2) Gene characterization: covers DNA sequence analysis, assessment of gene expression, functional genomics approaches, and production of transgenic plants; (3) Analysis and characterization of proteins and metabolites: includes proteomics approaches to the analysis of plant proteins, protein-protein interactions, and metabolic profiling through emerging metabolomic techniques. This course consists of two lectures and one day of discussion per week. Course material is coordinated with BIOPL 4610 (lab). Emphasis is on understanding techniques and approaches appropriate for different experiments and objectives.

**BIOPL 4832 Proteomics in Plant Biology**
Fall. 2 credits. Lec. Prerequisites: BIOGD 2810 and BIOBM 3300 or 3320, or equivalents. Recommended: BIOBM 3310. S-U or letter grades. 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; phospholipid 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 (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. 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. 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 4835 (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. Next offered 2009–2010. 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. 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 of 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 substitute for this course. S–U or letter grades. (12 lec). S. Gan.

**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, bioinformatic 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. O. K. Batamaniuk, 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 Hortorum 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. R. M. Spanwick.

For description, see BEE 6490.

**BIOPL 6510 Water Transport in Plants (also BEE 6470)**
Fall. 2 credits. Letter grades only. Lec. Offered alternate years; next offered 2009–2010. R. M. Spanwick.

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 2009–2010. J. Revel.

Analysis of the International Code of Botanical Nomenclature and its application to various plant groups.

**BIOPL 6560 Topics in Plant Evolution**
Spring or fall. 4 credits. Prerequisite: BIOPL 4880 or equivalent background in evolution, or written permission of instructor. Lab and disc. Offered alternate years. 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 (no official enrollment). 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**
Fall. 2 credits. Prerequisite: first- and second-year graduate students in Plant Cell and Molecular Biology Program. Disc.

**BIOPL 7430 Problems in Plant Molecular Biology**
Fall and spring. 0 credits (no official enrollment). Requirement for graduate students doing work in plant biology. W. L. Crepet.

Lectures on current research in plant biology, presented by visitors and staff.
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 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, second-, third-, and fourth-year graduate students in Plant Cell and Molecular Biology. Sem. Staff. Each student presents one seminar per year on his or her thesis research and then meets with the thesis committee members for evaluation.

**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)
- Fungi (PLPA 3090)
- Seaweeds, Plankton, and Seagrass: The Ecology and Systematics of Marine Plants (BIOSM 4490)
- Fungal Biology (PLPA 6490)
- Physiological Plant Ecology, Lectures and Laboratory (BIOEE 4660/468)
- 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, G14 Simson Hall, or at www.sml.cornell.edu.

**Undergraduate Specialization in Marine Biology**
Biological sciences majors in the Ecology and Evolutionary Biology program of study have the option of specializing their program of study 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. In addition to fulfilling the major and the ecology and evolutionary biology program of study requirements, students in marine biology are encouraged to enroll in the following courses:
1. BIOEE 1540 The Sea: An Introduction to Oceanography
2. BIOSM 3640 Field Marine Science or BIOSM 3750 Field Marine Biology and Ecology
3. At least one 4000-level BIOSM field course at the Shoals Marine Laboratory, particularly BIOSM 4100 Animal Social Behavior, BIOSM 4150 Research in Marine Biology, BIOSM 4400 Marine Botany, BIOSM 4720 Marine Phylogenetics, and BIOSM 4770 Anatomy and Function of Marine Vertebrates.
4. BIOE 4620 Marine Ecology

**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 advanced courses from the following list to fulfill their major requirements:
- BIOSM 3080 Field Microbial Ecology
- BIOSM 3090 Climates and Ecosystems
- BIOSM 3100 Marine Symbiosis
- BIOSM 3120 Biology of the Lobster
- BIOSM 3290 Ecology of Animal Behavior
- BIOSM 3640 Field Marine Science
- BIOSM 3650 Underwater Research
- BIOEE 3730 Biology of the Marine Invertebrates
- 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 4130 Research in Marine Biology
- BIOSM 4450 Forensics Science for Marine Biologists
- BIOSM 4490 Marine Botany
- BIOSM 4650 Sharks: The Biology, Evolution, and Conservation of Sharks and Their Allies
- BIOSM 4770 Marine Vertebrates
- BIOEE 4570 Limnology
- BIOEE 4620 Marine Ecology
- BIOEE 4780 Ecosystem Biology
- BIOE 4900 Topics in Marine Biology
- EAS 3750 Sedimentology and Stratigraphy
- EAS 4550 Geochemistry
- EAS 4750 Special Topics in Oceanography
- EAS 4790 Paleobiology

Students in both marine science specializations are exposed to an integrated program of study, emphasizing a natural progression of formal course work combined with ample opportunities for practical field experience.

**SEA Semester**
SEA courses must be taken concurrently. This program is run by Sea Education Association in Woods Hole, Mass. Contact SEA @ 800-552-3633.
- BIOSM 3660 SEA: Introduction to Oceanography
- BIOSM 3670 SEA: Introduction to Maritime Studies
- BIOSM 3680 SEA: Introduction to Nautical Science
- BIOSM 3690 SEA: Practical Oceanography I
- BIOSM 3700 SEA: Practical Oceanography II
- BIOSM 3720 SEA: Practical Oceanography III
- BIOSM 3780 SEA: Oceans and Climate: Oceans in the Global Carbon Cycle
- BIOSM 3790 SEA: Ocean Science and Public Policy
- BIOSM 3800 SEA: Oceanographic Field Methods
- BIOSM 3810 SEA: Independent Research in Oceans and Climate
- BIOSM 3860 SEA: Maritime History and Culture
- BIOSM 3710 SEA: Marine Environmental History
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, and 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 on Appledore Island is limited to one hundred people at any one time. Most educators and faculty members 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. Heizer. 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 a browsing library with 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 Cornell Marine Programs Office. (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: score of 4 or higher on AP Biology Exam (which fulfills introductory biology requirement for biology majors). Letter grades only.
W. E. Bennis, J. B. Heizer, and D. Taylor.
A four-week course for pre-freshmen at Shoals Marine Lab (SML) on Appledore Island in the Gulf of Maine including daily fieldwork, boat trips, outdoor adventure, and practices for sustainable living. Intensive lectures, laboratory, and fieldwork occur in a learning environment emphasizing field 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
An inquiry-based, hands-on introduction to marine biology using the rocky intertidal and open sea as a natural laboratory. Students will learn the skills necessary for success in science courses: understanding disciplinary discourse; reading scientific papers critically; generating scientific hypotheses; designing experiments and interpreting data using basic statistics; and constructing, presenting, and understanding data in graphs and tables. Students will learn and apply these skills to field exercises centered on textbooks, primary literature, lectures, seminars and discussions.

BIOSM 1600 The Oceanography of the Gulf of Maine
Summer. 3 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, 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
Allows students who are not biology majors to experience the breadth of the marine sciences under field conditions at an island laboratory. Aspects of biology, geology, earth science, chemistry, and physics are included. Specific topics include beach, salt marsh, tidal mud flat, tide pool, and benthic offshore environments; identification of marine plants and animals; chemical and physical oceanography; marine geology; and ecology of kelp beds and urchin barrens.

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 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. Bennis.
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 graduation 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. Cornell, UNH, SML faculty and staff.
Students will consider the imperative of institutionalizing sustainability. Through guest lectures and fieldwork, they will grapple with
challenges inherent to the field, devising strategies to enhance sustainability on Appledore Island. Topics include: systems thinking, food and fisheries, engineering and energy, and climate science.

**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 Sholes 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. 2 credits. Prerequisite: college-level introductory biology or equivalent S-U or letter grades. A one-week course offered at Sholes Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. H. Weeks and K. Flessa. Students will study the construction 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. Students are required to be familiar with the New England region, and explore potential pathways to success through readings and field trip.

**BIOSM 3080 Field Microbial Ecology**
Summer. 4 credits. Prerequisite: introductory biology or permission of instructor. S-U or letter grades. A two-week course offered at Sholes 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 microcrustaceans. 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 Sholes 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. G. Courtin. Study of the fundamentals of organism-environment interaction developed through defining and measuring abiotic factors including solar radiation, temperature, atmospheric moisture, precipital wind, and currents. One will be able to describe the dynamics of meteorology and the role of abiotic and biotic factors in the life of coastal and marine plants and animals including humans.

**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 Sholes Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec and fieldwork for two weeks. SML faculty. Introduction to the concepts of symbiosis as applied to marine organisms, with an emphasis on microbial symbionts. Students develop the ability to analyze symbioses using a comprehensive set of criteria, including duration, propagation, specificity, integration and modes of interaction. Morning lectures are followed by afternoons collecting, preparing and studying live specimens. Each student learns to use a variety of light microscopic techniques, and contributes, through fieldwork and written reports, to a comprehensive survey of symbiotic associations on and around Appledore Island.

**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 Sholes 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 only. A two-week course offered at Sholes Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. F. Fish. A study of the structure, form, and function of morphological adaptations in marine plants and animals as examined through a mechanical and ecological perspective. The course will investigate the biomechanics of marine organisms through lecture, laboratory demonstrations, and independent research projects.

**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 Sholes Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. W. E. Bemis, EEBH faculty, and F. Fish. Course includes introductions to vertebrae systematics, paleontology and evolution, vertebrae 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 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 Sholes 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. Zecheman, 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 activities 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 Sholes 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.
BIOE 3730  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 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. Sikich. 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 the laboratory, field, 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 BIOE 3760 after taking BIOE 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 summer 2010. J. Morin. Introduction to the biology and evolution of the major invertebrate phyla, concentrating on marine representatives. Emphasizes the evolution of form and function, and the ecology, behavior, physiology, chemical ecology, and natural history of invertebrates. Appledore Island's unique location provides an on-shore venue for the study of freshly collected and in situ representatives of most of the major phyla.]

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 lec 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 strategies, and the functional adaptations of 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. W. E. Bemis, EE&B faculty. Includes fieldwork, culture methods, histology, microscopy, and photomicrography. Students will do comparative study of invertebrate and vertebrate embryos in the context of life-history strategies. This course emphasizes marine species from Gulf of Maine. Topics include: gametogenesis, fertilization, cleavage, gastrulation, organogenesis, cytodifferentiation and larval biology. Student projects will detail embryology and life history of specific species.

BIOSM 4100  Animal Social Behavior  
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. T. Seeley, P. Sherman, and J. Sherman. An introduction to the study of animal behavior in the field by focusing on the behavior of the herring gulls nesting on Appledore Island. Topics will include natural selection and behavior, levels of analysis, animal communication, territoriality, kin recognition, orientation, and mating systems. The Herring Gull's World, the classic book of Nobel Laureate Niko Tinbergen, will be read and discussed. Methods of measuring behavior and designing experiments will be taught, and students will conduct individual research projects.

BIOSM 4130  Research in Marine Biology  
Summer. 6 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 three weeks. D. Taylor, D. Pudge, and A. Todgham. A hands-on course in which students explore the marine environment around Appledore Island via field and laboratory experiments of their own design, 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 (SML), original research, lectures, and data collected by previous classes. Phenomena investigated in previous years include: predator-prey interactions, vertical migration in zooplankton, biomechanical design of gastropod 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 will study 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 Marine Biologists  
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. R. Zechman. Overview of the major marine algal groups, including aspects of anatomy, morphology, development, life histories, physiology, and use. Laboratories and fieldwork emphasize relationships between distribution and major environmental parameters and involve student projects.

BIOSM 4650  Sharks: The Biology, Evolution, and Conservation of Sharks and Their Allies  
Summer. 2 credits. Prerequisite: vertebrates or comparative anatomy and ichthyology or permission of SML director. S-U or letter grades. A one-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 Marine Phylogenomics**
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 Shools 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 Shools Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec, lab, and fieldwork for three weeks. J. Heiser.

Topics in marine vertebrate biology emphasizing laboratory studies, field collections or observations, and readings from the current literature. Topics include systematics of fishes of the Gulf of Maine; elasmobranch physiology; interpretation of life history and parameters from otolith microstructure; teleost skeletomuscular structure and function; population biology and the contemporary Gulf of Maine fishery; Mesozoic marine reptiles; the biology of sea turtles in cold water; coloniality in sea birds; avian adaptations to life at sea; evolution and systematics of marine mammals; diving physiology; and ecology and conservation of existing marine mammal populations. Dissection of vertebrate animals is a part of one or more laboratory sessions.

**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 Shools Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Weekly sem for eight weeks. SML faculty. Seminar course on research methodology, experimental design, statistical analyses, and scientific writing. The course is designed to assist students in the research they are conducting while enrolled in BIOSM 4990.

**BIOSM 4990 Research in Biology**
Summer. Variable credit; 2 credits per seven days on site. A three-week course offered at Shools 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 Shools 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. Prerequisite: one year college-level biology. Recommended: teaching experience. A one-week course offered at Shools Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Daily lec and fieldwork for one week. SML faculty.

Intended for teachers of grades 6–12 but also open to undergraduate junior and senior students interested in teaching. Teachers develop hands-on, experiential approaches to the marine sciences, with an emphasis on coastal and environmental issues. Extensions to freshwater ecology also are included. Fieldwork is expanded with numerous excursions to the rocky intertidal and with off-shore ocean sampling. Lectures focus on biodiversity, adaptations, predator-prey interactions, environmental sustainability, and how to engage and motivate students with aquatic projects.

**BIOSM 6990 Research in Biology for Teachers**
Summer. 2 credits per week. Prerequisite: BIOSM 6500. One-week course offered at Shools Marine Laboratory (SML), on Appledore Island in the Gulf of Maine. Opportunity for teachers who have taken BIOSM 6500 to return to Shools to pursue in greater depth a topic of their choosing under the direction of the BIOSM 6500 faculty.

**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 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 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**
**BIOSM 3660 SEA 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.

**BIOSM 3670 SEA Introduction to Maritime Studies** 3 credits. Corequisites: BIOSM 3660 and 3670. 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.

**BIOSM 3680 SEA 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.

**BIOSM 3690 SEA 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.

**BIOSM 3700 SEA 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.
The impact of European expansion.

Patterns of settlement and development, and 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.

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.

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 thesis research.

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.
Other Teaching Personnel
Blankenship, James E., M.S., Cornell U. Sr. Lect., Molecular Biology and Genetics
Calvo, Rita A., Ph.D., Cornell U. Courtesy Sr. Lect., Molecular Biology and Genetics
Chen, Kuei-chiu, Ph.D., New York U. Lect., Neurobiology and Behavior
Ely, Susan, Ph.D., Tufts U. Sr. Lect., Molecular Biology and Genetics
Hester, Laurel, Ph.D., U. Michigan. Lect., Neurobiology and Behavior
Lorr, Nancy, Ph.D., U. of Oregon. Lect., Physiology
McGuire, Betty A., Ph.D., U. of Massachusetts. Sr. Lect., Ecology and Evolutionary Biology
Merkel, Susan, M.S., Cornell U. Sr. Lect., Microbiology
Nivison, Helen T., Ph.D., U. of California, Davis. Sr. Lect., Molecular Biology and Genetics
Rehklugler, Carole M., M.S., Cornell U. Sr. Lect., Microbiology
Silva, Thomas, Ph.D., Cornell U. Sr. Lect., Plant Biology
Southard, Laurel E., M.S., Tulane U. Lect., Undergraduate Biology

Joint Appointees
Bloom, Stephen E., Prof., Veterinary/ Microbiology and Immunology
Bradbury, James G., Prof., Evolutionary Biology and Behavior/Library of Natural Sounds
Bruntin, Thomas, Prof., Plant Breeding/Plant Biology
Doyle, Jeffrey J., Prof., Plant Biology (Bailey Hortorum)/Plant Biology General
Fetcho, Joseph R., Ph.D., U. of Michigan. Prof., Plant Biology (Bailey Hortorum)/Plant Biology General
Huffaker, Tim C., Ph.D., Massachusetts Inst. of Technology. Prof., Neurobiology and Behavior
Howland, Howard C., Ph.D., Cornell U. Prof., Ecology and Evolutionary Biology
Hinkle, Peter C., Ph.D., New York U. Prof., Molecular Biology and Genetics
Hoy, Ronald R., Ph.D., Stanford U. Prof., Neurobiology and Behavior
McClure, Polley A., Prof., Information Science and Technology. Prof., Molecular Biology and Genetics
Rehkugler, Carole M., M.S., Cornell U. Sr. Lect., Microbiology
Silva, Thomas, Ph.D., Cornell U. Sr. Lect., Plant Biology
Southard, Laurel E., M.S., Tulane U. Lect., Undergraduate 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
Breitscher, Anthony P., Ph.D., Leeds U. 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
Emr, Scott, Ph.D., Harvard U. Frank H.T. Rhodes Class of ’56 Endowed Director of 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
Gerber, Thomas B., Ph.D., Duke U. Prof., Psychology and Education Administration/Plant Biology
Gibson, Quentin H., Ph.D./D.Sc., Queen’s U. Prof., Ecology and Evolutionary Biology
Gould Schurman Professor of Population Genetics, Molecular Biology and Genetics/Ecology and Evolutionary Biology
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
Hainstock, 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
Lii, Siu Sylvia, Ph.D., Bailor 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
Lobas, 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
Nicholson, Linda, Ph.D., Florida State U. Assoc. Prof., Molecular Biology and Genetics
Pless, 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
Province, 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, Kelly L., Ph.D., U. of Washington, 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
Tumbar, 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

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., 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
Beuzdienhout, 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
Catalano, James, M.S., Ph.D., Union Coll. Sr. Res. Assoc., Population Medicine and Diagnostic Services
Chuang, Hua-hu, Ph.D., U. of California. Asst. Prof., Molecular Physiology
Fordham, 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. Asst., Biomedical Sciences
Fortune, Joanna E., D.V.M., Ph.D., Cornell U. Prof., Biomedical Sciences
Gilmour, Robert F., Ph.D., SUNY Upstate Medical Center. Prof., Biomedical Sciences
Gleed, Robin, B.V.M., MRCVS, U. of Liverpool (England). Assoc. Prof., Clinical Sciences
Gunn, Teresa M., Ph.D., U. of British Columbia (Canada). Asst. Prof., Biomedical Sciences
Herman, John W., M.S., Ph.D., U. of Florida. Gainesville. Assoc. Prof., Biomedical Sciences
Houp, Katherine A., V.M.D., Ph.D., U. of Pennsylvania. Prof., Clinical Sciences
Kolikoff, 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
Lidders, 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, Scan, D.V.M., Ph.D., U. of Pennsylvania. Assoc. Prof., Biomedical Sciences
Meyers-Wallen, Vicki, V.M.D., Ph.D., U. of Arizona. 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
Njia, 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'Brien, Timothy, Ph.D., U. of Illinois. Prof., Biomedical Sciences
Osvald, Robert, Ph.D., Vanderbilt U. Prof., Molecular Medicine.
Quarini, 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

Division of Nutritional Sciences
Joint Appointees
Creese, John L., Prof., Nutritional Sciences/Molecular Biology and Genetics
Bensadoun, Andre, Prof., Nutritional Sciences/Molecular Biology and Genetics
Kazarian, Michael N., Assoc. Prof., 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
The program of study in computational biology is part of the biological sciences major offered through 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 information sciences. It is designed for students who want to emphasize basic biological science.

The concentration in computational molecular biology is offered by the Department of Computer Science to students enrolled in the College of Arts and Sciences and the College of Engineering. It provides core training in computer science and biology. It is designed for students who want to emphasize computational science.

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
Computational science and engineering is an emerging CIS program. Numerous courses are taught throughout the university. Topics include numerical methods, modeling and simulation, and real-time computing and control.

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 programming languages and compilation, computing systems, artificial intelligence, natural language processing, computer graphics, computer vision, databases and digital libraries, networks, bioinformatics, the theory of algorithms, scientific computing, computational logic, architecture, and security.

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.

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 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.

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. Overwhelming interest also sparked the creation of the Game Design Initiative at Cornell University (GDIAC) in 2003. This organization is a group of students, faculty, alumni, and community members who are devoted to the establishment of game design as an academic discipline. 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 (ISS), 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 ISS majors, please refer to the respective colleges.

The minor in information science is available to students in all undergraduate colleges.

Statistical Science

The university-wide Department of Statistical Science coordinates activities in statistics and probability at the undergraduate, graduate, and research levels.

The department is organized into four units: Biological Statistics, Engineering Statistics, Mathematical Statistics and Probability, and Social Statistics. The areas covered include agricultural 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.

Students interested in graduate study in statistics and probability can apply to the graduate field of statistics or to one of the other graduate programs 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.

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 Systems. A statistical consulting service is offered by the faculty of DSS and the Cornell Statistical Consulting Unit (CSCU), 255-1926. There is no charge to members of the Cornell community for using the Statistical Consulting Service. It provides guidance to researchers in a broad variety of fields on designing experiments, collecting and analyzing data, and drawing appropriate conclusions from the results of their studies. Statistical computing consulting is also available through the Office of Statistical Consulting, B21 Savage Hall, 255-1926.

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 study the relationship between humans and information, drawing from human-computer interaction and cognitive science. Social systems examine information in its economic, legal, political, cultural, and social contexts. Information systems study 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. 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 take ENGRD 2700 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 2100 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 Psychology of Social Computing
- PSYCH 2800 Introduction to Social Psychology
- PSYCH 3420 Human Perception: Applications to Computer Graphics, Art, and Visual Display
- INFO 3450 Human-Computer Interaction Design

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 2100 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 Psychology of Social Computing
- PSYCH 2800 Introduction to Social Psychology
- PSYCH 3420 Human Perception: Applications to Computer Graphics, Art, and Visual Display
- INFO 3450 Human-Computer Interaction Design
**Computing and Information Science (CIS) - 2008–2009**

- PSYCH 3470 Psychology of Visual Communications
- INFO 3650 Technology in Collaboration
- PSYCH 3800 Social Cognition
- PSYCH 4130 Information Processing: Conscious and Unconscious
- 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 Technology, Information, and Business 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
- ECON 4490 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 4760/4770 Decision Theory I and II
- INFO 4850 Computational Methods for Complex Networks
- INFO 5150 Culture, Law, and Politics of the Internet
- HADM 5574 Strategic Information Systems*

*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 AEM 3220 and HADM 5574 may be taken for IS credit.

**Information Systems**

- INFO 1301 Introduction to Programming and Web Applications
- INFO 1302 Introduction to Designing Web Applications* (equivalent to one course)
- INFO 1700 Computation, Information, and Intelligence
- CS 2110 Computers and Programming*
- INFO 2300 Intermediate Design and Programming for the Web*
- CIS 3000 Introduction to Computer Game Design
- INFO 3300 Data-Driven Web Applications
- INFO 4500 Information Retrieval
- INFO 4502 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 1301 and 1302: Engineering students and Computer Science majors may not use these courses 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, 1190, 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/ENGRD 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 4509, ART 1700, CS/ENGRD 1620)
Fall. 3 credits.
For description, see ART 1700.

**CIS 1900** Virtual Worlds
Fall. 4 credits.
Survey covering the technology, design, and application of virtual worlds for education, training, and entertainment. Lectures and readings introduce the various aspects of computing and information science, including hardware, software, interactive design, usability, and the context in which this new social communication environment is used. Lab sessions, students serve in teams as online mentors (no travel required) to middle school students in after-school CYFair (CyberYouthFair) programs. These programs focus on participatory, project-based learning using collaborative virtual world environments and online information tools for data analysis and visualization.

**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/ENGRD 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 game 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**
Spring. 3 credits. Prerequisites: CIS 3000 and 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. S-U grades only. An introduction to high-performance computing (HPC) for graduate students or advanced undergraduate students who will use HPC as a tool in their research. Various HPC architectural platforms are described with a focus on computational clusters. Students learn how to identify and exploit the various types of parallelism in algorithms and legacy applications. Understanding how to measure speedup and efficiency and how various bottlenecks affect them are covered. Parallel programming with MPI, OpenMP, and task-farming techniques such as the use of web services are covered in detail. 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 8–14. 2 credits. Prerequisites: basic computer programming skills or permission of instructor. S-U grades only. 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 workflows 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 of plans for internships and student projects.

CIS 4999 Independent Reading and Research
Fall, spring. 1–4 credits. Independent reading and research for undergraduate students. Fall, spring. Prerequisite: enrollment may be limited. For description, see SYSEN 7682.

CIS 7970 Topics in CIS/IGERT Seminars
Fall, spring, 1 credit. S-U grades only. Discusses diverse topics in nonlinear systems. The seminar is oriented to the requirements for the IGERT Program in Nonlinear Systems, a National Science Foundation-supported graduate training program. Includes a mixture of student, faculty, and visitor presentations and development of plans for internships and student projects.

CIS 7999 Independent Research
Fall, spring. Variable credit. Prerequisite: permission of CIS faculty member. Independent research or master of engineering project.

CIS 6229 Computational Methods for Nonlinear Systems (also PHYS 7682)
Fall. 4 credits. Enrollment may be limited. For description, see PHYS 7682.

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. 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 who have 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, 1190, 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 1130 Transition to Object-Oriented Programming—Honors
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, development of algorithms and programs. MATLAB. Emphasizes the systematic development of algorithms and programs. Covers the MATLAB environment, development of algorithms and programs.

CS 1134 Introduction to Computing in the Arts (also CS 1610, 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 1135 Using MATLAB and Robotics
Fall, spring. 4 credits. Prerequisite: some programming experience. Next offered 2009–2010. 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 1301 Introduction to Programming Web Applications
Fall, weeks 1–7. 2 credits. Students must enroll in both CS 1301 and 1302. For description, see INFO 1301.

CS 1302 Introduction to Designing Web Applications
Fall, weeks 8–14. 2 credits. Students must enroll in both CS 1301 and 1302. Prerequisite: CS 1301 or equivalent knowledge. For description, see INFO 1302.

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. MUSC 1414.

**CS 20 Advanced UNIX Programming and Tools**

Fall, Spring, and Summer. 1 credit. Prerequisite: CS 1110 or equivalent 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 2042 Unix Tools**

Fall, Spring, and Summer. 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 2111 Programming Practicum**

Fall, Spring. 1 credit. Pre- or corequisite: CS/ENGRD 2110. Letter grades only. Project course that introduces students to the ways of software engineering using the Java programming language. The course requires the design and implementation of several large programs.

**CS 2300 Intermediate Design and Programming for the Web (also INFO 2300)**

Spring. 3 credits. Prerequisite: CS 1501 and 1502 strongly recommended. 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. S-U grades only. 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: One programming course and MATH 2210 or 2940, knowledge of discrete probability and random variables at the level of CS 2900. 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/ENGRI 2110. 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**

Fall. 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 3700 Explorations in Artificial Intelligence (also INFO 3720)**

Spring. 3 credits. Prerequisites: MATH 1110 or equivalent, statistics course, and CS/ENGRI 2110 or permission of instructor. Next offered 2009–2010. For description, see INFO 3720.

**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 4110 Programming Languages and Logics**

Fall. 4 credits. Prerequisite: CS 3110 or permission of instructor. Next offered 2009–2010. Introduction to the theory, design, and implementation of programming languages.
Topics include operational semantics, type systems, higher-order function, scope, lambda calculus, laziness, exceptions, side effects, continuations, objects, and modules. Also discussed are logic programming, concurrency, and distributed and persistent programming.

[CS 4120 Introduction to Compilers]  
Spring. 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]  
Spring. 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.  
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 and disadvantages of each method. Applications are presented throughout the course.

[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 and disadvantages of each method. Applications are presented throughout the course.

[CS 4221 Practicum in Database Systems]  
Fall. 2 credits. Prerequisite: CS 4210.  
Students build part of a real database system in C++.

[CS 4410 Operating Systems]  
Spring. 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]  
Spring. 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 475750)]  
Fall. 4 credits. Prerequisites: ENGRD 2300 and CS 3420/ECE 3140.  
For description, see ECE 4750.

[CS 4450 Computer Networks]  
Spring. 4 credits. Pre- or corequisite: CS 4410 or permission of instructor.  
Introduction to computer networks with an emphasis on fundamentals. Detailed introduction to networking protocols for reliable data transfer, flow control, congestion control, naming and addressing, routing, and security. Fundamentals of layered protocols and techniques for protocol design and implementation. Course material is supplemented by network measurement projects, protocol simulations, and a substantial protocol implementation project running over sockets that makes use of C or C++.

[CS 4520 Introduction to Bioinformatics]  
Spring. 4 credits. Prerequisites: CS/ENGRD 2110 and CS 2800.  
Overview of the goals, tools, and techniques used in bioinformatics, a field that applies ideas from computer science, mathematical modeling, and statistics in order to make sense of the huge datasets that typify modern biology. Topics include a brief introduction to molecular biology, DNA sequencing, sequence alignment and multiple alignment, similarity searches and their statistics, phylogeny, gene regulation and motif finding, gene finding, and genome rearrangements. Much of the course is devoted to an in-depth study of the algorithms behind popular computational tools such as Smith-Waterman, BLAST, CLUSTALW, Genscan, and MEME.

[CS 4620 Introduction to Computer Graphics (also ARCH 3704)]  
Fall. 4 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 4702 Artificial Intelligence: Uncertainty and Multi-Agent Systems]  
Spring. 4 credits. Prerequisites: CS/ENGRD 2110 and CS 2800 or equivalent.  
A key issue in the design of intelligent systems is how to deal with uncertain or incomplete information, as obtained, for example, through (noisy) sensory input. The first half of this course focuses on how to represent and reason with uncertain information. The second half covers the study and design of multi-agent systems. Topics include Bayesian networks, dynamic Bayesian networks, belief propagation, Markov random fields, exact and approximate probabilistic inference methods, Markov Chain Monte Carlo methods, connections to statistical physics and information science, adversarial reasoning and planning in multi-agent systems, and game theoretic notions underlying multi-agent systems. This course complements CS 4700 but is given as a self-contained unit.

[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. Next offered 2009-2010.  
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). 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. Next offered 2009–2010. 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), computational complexity focusing on NP-complete 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), CS 3810 (or mathematical maturity), or permission of instructor. 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: CS 3810. Covers the mathematical foundations 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)**
Spring. 4 credits. Prerequisites: MATH 2220 or 2940, CS 2800 or equivalent (e.g., MATH 3520, 4320, 4340, 4810), and some additional computer 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**
Spring. 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. This work includes a feasibility study, requirements analysis, object-oriented design, implementation, testing, and delivery to the client. Additional topics covered in lectures include professional software project management, and the legal framework for software development.

**CS 5300 The Architecture of Large-Scale Information Systems (also INFO 5300)**
Spring. 4 credits. Prerequisite: CS/INFO 5300 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 2008. 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 6270)**
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 2009. 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 didactical alternatives for implementing the properties that comprise “trustworthiness” in a computing system. Covers mechanisms for authorization and authentication as well as cryptographic protocols.

**CS 5450 Advanced Computer Networks (also CS 6450)**
Fall or spring. 4 credits. Prerequisite: CS 4450 or permission of instructor. Offered fall 2008. Examines advanced computer network topics such as overlay and P2P networking, reliable multicast, mobility, voice-over IP, header compression, security, and extreme networking environments (fast, slow, big, long). Emphasizes both research and the latest standards. A project with research content is required. (CS 5450 is for M.Eng. students; CS 6450 for Ph.D. students.)

**CS 5560 Interactive Computer Graphics**
Spring. 4 credits. Prerequisite: CS 4620. Next offered 2009–2010. 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 5564 Computer Animation (also ART 2703, CIS 5640)**
Fall. 4 credits. Prerequisites: none. Next offered 2009–2010. For description, see ART 2703.

**CS 5564 Advanced Animation (also ART 3702, CIS 5642)**
Spring. 4 credits. Prerequisites: none. Next offered 2009–2010. For description, see ART 3702.

**CS 5643 Physically Based Animation for Computer Graphics**
Spring. 4 credits. Prerequisites: CS/ENGRD 5220 and/or CS 4620 or permission of instructor. Offered alternate years. 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 5640)**
Fall or spring. 3 or 4 credits. Prerequisites: CS/ENGRD 5210 or 5220 and/or CS 4620 or permission of instructor. Next offered 2009–2010. Offered alternate years. For description, see CEE 5290.

**CS 5780 Empirical Methods in Machine Learning and Data Mining**
Fall or spring. 4 credits. Prerequisites: CS 2800 and 3110 or equivalent. Next offered 2009–2010. This implementation-oriented course presents a broad introduction to current algorithms and approaches in machine learning, knowledge discovery, and data mining and their application to real-world learning and decision-making tasks. The course also covers experimental methods for comparing learning.
algorithms, for understanding and explaining their differences, and for exploring the conditions under which each is most appropriate.

CS 5846 Decision Theory I (also ECON 4760/6760)
Fall. 4 credits. Prerequisite: mathematical sophistication.
For description, see ECON 4760.

CS 6121 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 of programming methodology.

CS 6210 Matrix Computations
Fall. 4 credits. Prerequisites: MATH 4110 and 4310 or permission of instructor.
Offered alternate years; next offered 2009–2010.
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 6220 Sparse Matrix Computations
Fall. 4 credits. Prerequisite: CS 6210.
Methods for large sparse matrix problems. Krylov subspace techniques are featured, e.g., conjugate gradients, Lanczos, Arnoldi. Applications from differential equations and optimization methods based on random sampling are also covered. Assignments in MATLAB.

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 2008.
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 6450 Research in Computer Networks
Fall. 4 credits. Prerequisite: CS 4450 or permission of instructor. Offered fall 2008.
Examines advanced computer network topics such as overlay and P2P networking, reliable multicast, mobility, voice over IP, header compression, security, and extreme networking environments (fast, slow, big, long). The emphasis is on both research and the latest standards. A project with research content is required. CS 6450 is for Ph.D. students; CS 5450 is for M.Eng. students.

CS 6460 Peer-to-Peer Systems
Spring. 4 credits. Recommended: CS 6410.

CS 6522 Biological Sequence Analysis
Fall. 4 credits. Prerequisites: none.
Typically concentrates on one topic in biological sequence analysis, providing an in-depth analysis of the algorithmic and statistical challenges in that area. The selected topics vary from year to year.

CS 6620 Advanced Interactive Graphics
Fall or spring. 4 credits. Prerequisites: CS 4620 and 4621 or 5620 or permission of instructor.
State-of-the-art techniques for high-quality rendering in graphics. Focus on practical rendering algorithms that have had (or are poised to have) big impact in industry. Covers core rendering techniques used in simulation, games, and movies. Topics include photon mapping, environment map lighting, precomputed radiance transfer, radiosity, scalable rendering, GPU global illumination including shadow algorithms, hierarchical acceleration structures, interactive ray tracing on modern architectures including multicomputer processors and GPUs, cinematic relighting for movie rendering, and perceptually based rendering. Focus is on practical rendering algorithms for graphics applications.

CS 6630 Realistic Image Synthesis
Fall or spring. 3 credits. Prerequisites: CS 4620 or equivalent and undergraduate-level understanding of algorithms, probability and statistics, vector calculus, and programming.
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.
Covers computational aspects of motion, broadly construed. Topics include the computer representation, modeling, analysis, and simulation of motion, and its relationship to various areas, including computational geometry, motion generation, physical simulation, computer animation, robotics, biology, computer vision, acoustics, and spatio-temporal databases. Students implement several of the algorithms covered in the course and complete a final project.

CS 6670 Machine Vision
Fall or spring. 4 credits. Prerequisites: Ph.D. and MATH 2210 or equivalent.
Next offered spring 2010.
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 or spring. 3 credits. Prerequisite: permission of instructor. Neither CS 4300 nor CS 4740 are prerequisites. Offered fall 2008.
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. Material examines formalizing reasoning about knowledge and the extent to which knowledge is applicable to those areas. Issues include common knowledge, knowledge-based programs, applying knowledge to analyzing distributed systems, attainable states of knowledge, modeling resource-bounded reasoning, and connections to game theory.

CS 6766 Reasoning about Uncertainty
Fall. 4 credits. Prerequisites: mathematical maturity and acquaintance with propositional logic. Next offered 2009–2010.
Examines formalizing reasoning about and representing uncertainty, using formal logical approaches as a basis. Topics: logics of
probability, combining knowledge and probability, probability and adversarial, conditional logics of normality, Bayesian networks, qualitative approaches to uncertainty, going from statistical information to degrees of belief, and decision theory.]

[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.
Extends and complements CS 6780 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). For description, see BTRY 6790.

[CS 6810 Theory of Computing]
Spring. 4 credits. Prerequisites: CS 5810 and CS 4820 or 6820 or permission of instructor.
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 spring 2009.
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, pseudorandom 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. Next offered 2009–2010.
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 interaction 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 multiauction.

[CS 6850 The Structure of Information Networks (also INFO 6850)]
Fall or spring. 4 credits. Prerequisite: CS 4820.
For description, see INFO 6850.

[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. 4 credits. 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 7410 Topics in Systems]
Fall or spring. 3 credits. Prerequisite: 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)]
Fall. 4 credits. Prerequisite: programming experience or permission of instructor. 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 7772 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 7890 Seminar in Theory of Algorithms and Computing]
Fall, spring. 4 credits. Prerequisite: permission of a computer science advisor.
Independent research or master of engineering project.

[CS 7999 Thesis Research]
Fall, spring. Prerequisite: permission of a computer science advisor.
Doctoral research.

INFORMATION SCIENCE (INFO)

INFO 1301 Introduction to Programming Web Applications
Fall, weeks 1–7. 2 credits. Students must enroll in both INFO 1301 and 1302. Building functional and effective web sites that support users’ needs and capabilities requires a mixture of technical, design, and analytical skills. This course lays the foundation for proficient web design by covering the technical skills involved, including XHTML, the markup language used to encode web pages, and PHP, a programming language for building interactive web sites. This is an introductory programming course, and no programming background is assumed. Students in 1301 must be co-registered in INFO 1302, which builds on the programming expertise developed in 1301 to develop web design and usability skills.

INFO 1302 Introduction to Designing Web Applications
Fall, weeks 8–14. 2 credits. Students must enroll in both INFO 1301 and 1302. Prerequisite: successful completion of INFO 1301. Building functional and effective web sites that support users’ needs and capabilities requires a mixture of technical, design, and analytical skills. This course builds on the technical skills developed in INFO 1301 to develop full competency in web design. Students develop design and analytical skills including critical analysis, support for usability, user-centered design, and methods for visual layout. Skills will be developed in a studio and project-based format focused on the construction of compelling, functional web sites. To take this course students must either have received a passing grade in INFO 1301, or prove proficiency in PHP programming via a qualifying exam.
INFO 2040 Networks (also ECON 2040, SOC 2120)  
Spring. 4 credits.  
For description, see ECON 2040.

INFO 2140 Cognitive Psychology (also COGST/PSYCH 2140)  
Fall. 4 credits. Limited to 175 students.  
Prerequisite: sophomore standing.  
Graduate students, see INFO 6140 or COGST 6150.  
For description, see PSYCH 2140.

INFO 2300 Intermediate Design and Programming for the Web (also CS 2300)  
Spring. 3 credits. Prerequisite: INFO 1301 and 1302 strongly recommended.  
Web programming requires the cooperation of two machines: the one in front of the viewer (client) and the one delivering the content (server). CS 1300 concentrates almost exclusively on the client side. The main emphasis in CS 2300 is learning about server-side processing. Students begin by looking at interactions with databases, learning about querying both on paper and via SQL, and then, through a succession of projects, learn how to apply this understanding to the creation of an interactive data-driven site via the use of an integrated web development tool such as ColdFusion. Also considered are techniques to enhance security, privacy, and reliability and ways of incorporating other programs. Toward the end of the course, students are shown how these development tools are working. Design 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  
Fall, weeks 1–10. 1 credit. Prerequisite: INFO 2300.  
For description, see INFO 2310 in CIS section.

INFO 2450 Psychology of Social Computing (also COMM 2450)  
Fall, summer. 3 credits.  
For description, see COMM 2450.

INFO 2921 Inventing an Information Society (also AMST/ECE/ENGR 2980, HIST 2920, STS 2921)  
Spring. 3 credits.  
For description, see ENGRG 2980:0.

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) (CA)  
Spring. 3 credits.  
For description, see COMM 3200.

INFO 3300 Data-Driven Web Applications (also CS 3300)  
Fall. 3 credits. Prerequisite: CS 2110.  
Introduces students to modern database systems and three-tier application development with a focus on building web-based applications using database systems.

INFO 3450 Human-Computer Interaction Design (also COMM 3450)  
Spring. 3 credits.  
For description, see COMM 3450.

INFO 3490 Media Technologies (also COMM 3490, STS 3491)  
Spring. 3 credits. Offered odd-numbered years.  
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 3650 Technology in 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 3650) (CA)  
Fall. 4 credits.  
For description, see ARTH 3650.

INFO 3720 Explorations in Artificial Intelligence (also CS 3700)  
Spring. 3 credits. Prerequisites: MATH 1110 or equivalent, an information science–approved statistics course, and CS 2110 or permission of instructor.  
How do computers solve tasks as diverse as playing chess or blackjack, control autonomous space missions such as NASA's Deep Space One, plan the route for a driverless car as in the DARPA Grand Challenge race, perform content-based selection of music programs, or solve Sudoku, the latest puzzle craze? This course introduces students to a range of computational modeling approaches and solution strategies using examples from AI and Information Science. Covers different formalisms such as logical representations, constraint-based languages, mathematical programming, and multi-agent approaches (including adversarial games). Emphasis is on modeling, not on algorithms, but efficiency issues (complexity) are highlighted as part of the modeling approaches. Students also learn about the tradeoffs in modeling choices.

INFO 3871 The Automatic Lifestyle: Consumer Culture and Technology (also STS 3871)  
INFO 4144 Responsive Environments (also ARTH 4144) (CA)  
For description, see ARTH 4144.

INFO 4290 Copyright in the Digital Age (also COMM 4290)  
Fall. 3 credits. Offered odd-numbered years; next offered 2009–2010.  
For description, see COMM 4290.

INFO 4300 Information Retrieval (also CS 4300)  
Fall. 5 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)  
Spring. 3 credits. Prerequisites: background in computing, data structures, and programming at level of CS 2110 or equivalent, and experience using information systems. Undergraduates and master's students should register for INFO 4350; Ph.D. students should register for INFO 6350.  
This course brings together the interdisciplinarity of information science—technological, sociological, legal, economic, and political—through a series of case studies of applications and areas of current research. The case studies are explored through reading and discussion of recent articles on aspects of information science, both social and technical. Many of the case studies build on the Information Science seminar series and on current work at Cornell.

INFO 4400 Advanced Human-Computer Interaction Design (also COMM 4400)  
Fall. 3 credits. For description, see COMM 4400.

INFO 4450 Seminar in Computer-Mediated Communication (also COMM 4450)  
Fall. 5 credits. Prerequisite: COMM/INFO 2450.  
For description, see COMM 4450.
INFO 4470 Social and Economic Data (also IRLRE 4470)
Spring. 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 non-sampling 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 produced 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 CODIM 4500)
Spring. 3 credits. Prerequisites: COMM 2450 or permission of instructor. Next offered 2009–2010.
For description, see COMM 4500.

INFO 4850 Computational Methods for Complex Networks
Spring. 3 credits. Prerequisites: ECON/INFO 2040/SOC 2000 or CS 2850 or equivalent knowledge; CS 2110 or INFO 2300 or equivalent knowledge of basic programming.

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. 4 credits.
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
Fall. 4 credits.
Explores the culture, law, and politics of the Internet. Highlighted issues include: net neutrality, free speech, Internet governance, domain naming, intellectual property, DMCA compliance, transaction security, and the development of institutional as well as national policy for the Internet.

INFO 5300 The Architecture of Large-Scale Information Systems (also CS 5300)
Spring. 4 credits. Prerequisite: INFO/CS 3500 or CS 4520.
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 6002 Critical Technical Practices
INFO 6140 Cognitive Psychology (also COGST/PSYCH 6140)
Fall. 4 credits.
For description, see PSYCH 6140.

INFO 6144 Responsive Environments (also ARTH 6144)
For description, see ARTH 6144.

INFO 6300 Advanced Language Technologies (also CS 6740)
Fall or spring. 3 credits. Prerequisites: permission of instructor. Neither INFO/CS 4500 nor CS 4740 are prerequisites.
Offered fall 2008.
For description, see CS 6740 in CIS section.

INFO 6350 Seminar on Applications of Information Science (also INFO 4390)
Spring. 3 credits. Prerequisites: background in computing, data structures, and programming. At least CS 2110 or equivalent, and experience using information systems. Undergraduates and master’s students should register for INFO 4350. Ph.D. students for INFO 6350.
For description, see INFO 4350.

INFO 6400 Human-Computer Interaction Design (also COMM 6400)
Fall. 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.
For description, see LING 6648.

INFO 6650 Language and Technology (also COMM 6500)
For description, see COMM 6500.

INFO 6850 The Structure of Information Networks (also CS 6850)
Fall or spring. 4 credits. Prerequisite: CS 4820. Offered fall 2009.
Information networks such as the World Wide Web are characterized by the interplay between heterogeneous content and a complex underlying link structure. This course covers recent research on algorithms for analyzing such networks and models that abstract their basic properties. Topics include combinatorial and probabilistic techniques for link analysis, centralized and decentralized search algorithms, generative models for networks, and connections with work in the areas of social networks and citation analysis.

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

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
Birman, Kenneth, Dept. of Computer Science
Birnholtz, Jeremy, Information Science Program; Dept. of Communication
Blume, Lawrence, Information Science Program; Dept. of Economics
Booth, James, Dept. of Biological Statistics and Computational Biology
Bruce, Thomas, Information Science Program; Law School
Bunge, John, Dept. of Statistical Science; School of Industrial and Labor Relations
Butamanle, Carlos, Computational Biology Program; Dept. of Biological Statistics and Computational Biology
Cardie, Claire, Dept. of Computer Science; Information Science Program
Clark, Andrew, Computational Biology Program; Dept. of Molecular Biology and Genetics
Constable, Robert, Dept. of Computer Science
Demers, Alan, Dept. of Computer Science
Easley, David, Information Science Program; Dept. of Economics
Edelman, Shimon, Information Science Program; Dept. of Psychology
Ernst, Kevin, Computing in the Arts Program; Dept. of Music
Francis, Paul, Dept. of Computer Science
Friedman, Eric, Computer Science Field; Information Science Program; School of Operations Research and Industrial Engineering
Fuchs, W. Kent, School of Electrical and Computer Engineering
Gay, Geri, Information Science Program; Dept. of Communication
Gehrke, Johannes, Dept. of Computer Science
Gillespie, Tarleton, Information Science Program; Dept. of Communication
Ginsburg, Paul, Information Science Program; Dept. of Physics
Gomes, Carla, 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
Haas, Zygmunt, Computer Science Field; School of Electrical and Computer Engineering
Halpern, Joseph, Dept. of Computer Science; Information Science Program
Hancock, Jeff, Information Science Program; Dept. of Communication
Hartmanis, Juris, Dept. of Computer Science
Hemami, Sheila, Computer Science Field; School of Electrical and Computer Engineering
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
Keich, Uri, 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
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
Maroltar, Rajit, Computer Science Field; School of Electrical and Computer Engineering
Marschner, Steve, Dept. of Computer Science; Program of Computer Graphics
Martinez, Jose, Computer Science Field; School of Electrical and Computer Engineering
Myers, Andrew, Dept. of Computer Science
Nerode, Anil, Computer Science Field; Dept. of Mathematics
Nussbaum, Michael, Dept. of Statistical Science; Dept. of Mathematics
Pass, Rafael, Dept. of Computer Science
Pinch, Trevor, Information Science Program; Dept. of Science and Technology Studies
Prentice, Rachel, Information Science Program; Dept. of Science and Technology Studies
Rooth, Mats, Information Science Program; Dept. of Linguistics
Schneider, Fred, Dept. of Computer Science
Selman, Bart, Dept. of Computer Science
Senges, Phoebe, Information Science Program; Dept. of Science and Technology Studies
Shmoys, David, Dept. of Computer Science; School of Operations Research and Industrial Engineering
Siepel, Adam, Computational Biology Program; Dept. of Biological Statistics and Computational Biology
Srir, Enin Gun, Dept. of Computer Science
Spivey, Michael, Information Science Program; Dept. of Psychology
Suh, G. Edward, School of Electrical and Computer Engineering
Tardos, Eva, Dept. of Computer Science; Information Science Program
Tettelbaum, 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
Vidyashankar, Anand, Dept. of Statistical Science; School of Industrial and Labor Relations
Wells, Martin, Dept. of Statistical Science; Computational Biology Program
Wicker, Stephen, Computer Science Field; School of Electrical and Computer Engineering
Williamson, David, Information Science Program; School of Operations Research and Industrial Engineering
Yuan, Connie, Information Science Program; Dept. of Communication
Zabih, Ramin, Dept. of Computer Science
CONTINUING EDUCATION INFORMATION SERVICE

This service provides free information, counseling, and referral to adults who have been out of school for several years and want to resume their education. It also provides information about short courses, workshops, professional updates, and executive programs offered by the university to people inside and outside Cornell. For information, write to Continuing Education, B20 Day Hall, Ithaca, NY 14853-2801; call 607 255-4987; e-mail cusce@cornell.edu; or fax 607 255-9697.

CORNELL IN WASHINGTON PROGRAM

Cornell in Washington offers undergraduates the opportunity to combine the strengths of Cornell with all of the best parts of living and learning in Washington, D.C. Students take courses in the fall, spring, or summer for credit, work as externs, and complete substantial research projects, all the while enjoying the rich opportunities available in the nation’s capital. For information, write to Cornell in Washington, M101 McGraw Hall, Ithaca, NY 14853-6010; call 607 255-4090; e-mail cwash@cornell.edu; or visit www.ciw.cornell.edu.

DISTANCE LEARNING

Need a flexible schedule? Have a full-time job? Planning to travel during winter break or during the summer? Don’t let any of these 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 may include a web-based component, videotapes, and/or CD-ROMs. Students 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 students have the option of getting a head start on readings and lectures. For information, visit www.sce.cornell.edu/dl.

For faculty members 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 the course. Services are tailored to individual needs and ongoing support is available. Visit www.sce.cornell.edu/dl/ to see what’s possible.

CyberTower features three online program series, with new offerings added every month:

• **Study Rooms** contain video-streamed lectures, links to specially selected web sites, reading lists, and discussion boards with Cornell faculty 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 cybertower.cornell.edu. It’s all free and is a great way to see what Cornell has to offer.

EXECUTIVE AND PROFESSIONAL PROGRAMS

The school presents short, high-level professional updates on campus, online, and in locations worldwide. These courses are taught by Cornell faculty and senior research staff 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, call 607 255-7250; e-mail cusce@cornell.edu; fax 607 255-8942; or visit www.sce.cornell.edu/exec/.

EXTRAMURAL STUDY

Cornell students whose studies have been interrupted may find it useful to take classes on a part-time basis. The school is also dedicated to offering part-time study to staff, faculty, “townies,” 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 courses 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, write to Extramural Study, B20 Day Hall, Ithaca, NY 14853-2801; call 607 255-4987; e-mail cusce@cornell.edu; fax 607 255-9697; or visit www.sce.cornell.edu/exmu/.
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, call 607 255-7259; e-mail cusp@cornell.edu; fax 607 255-8942; or visit www.sce.cornell.edu/sp/.

On-Campus Special Programs Roster
AEM Certificate in Business Management
Architecture
Art in the Modern World
Asian Language Programs: Chinese, Japanese, Nepali, Sinhala, Tibetan
Biological Sciences Undergraduate Research Program
CCMR Institute for Chemistry Teachers (CICT)
CNS Institute for Physics Teachers (CIPT)
Cornell Institute for Biology Teachers (CIBT)
Education
Engineering Cooperative Education Program
English for International Students and Scholars
Freshman Summer Start
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
School of Hotel Administration Executive Education Programs
Teaching Writing
Telluride Association Summer Program

Off-Campus Special Programs Roster
Field Archaeology in New York State
Architecture: Western Europe, South America, and the Mediterranean
Art Studio and Creative Writing Workshop in Rome, Italy
Theatre, Film, and Dance in Europe: Dublin/Paris/Rome
High Technology Entrepreneurship Program in Silicon Valley
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 Program in Hong Kong
Investment Management Program
Latin American Studies: Quechua
Marine Science: Shools Marine Laboratory, Maine
Preflaw Program in New York City
Summer in Washington
Preflaw Program in New York City
Investment Management Program

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, Hong Kong, 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 in Silicon Valley
International Business Program in Hong Kong
Investment Management Program
Preflaw Program in New York City
Summer in Washington

SUMMER COLLEGE PROGRAMS FOR HIGH SCHOOL STUDENTS
Cornell's award-winning programs for high school students offer one-, three-, four-, and six-week programs for talented sophomores, juniors, and seniors from around the world. Participants live on our beautiful campus, take college classes with leading Cornell faculty, 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, call 607 255-6203; e-mail summer_college@cornell.edu; fax 607 255-6665; or visit www.summercollege.cornell.edu.

WINTER SESSION
Cornell undergraduate and graduate students, as well as employees and area residents, can earn up to 4 credits between the fall and spring semesters by enrolling in the winter session. This quiet time on campus allows students to enjoy generally smaller classes and to concentrate on intensive study. Winter-session students may enroll in scheduled courses or design individualized study with a faculty member. For information, write to Winter Session, B20 Day Hall, Ithaca, NY 14853-2801; call 607 255-4987; e-mail cusce@cornell.edu; fax 607 255-9697; or visit www.sce.cornell.edu/ws/. If a course also is offered through distance learning, the course title will be followed by DL.

Winter Session Course Roster
AEM 2400 Marketing DL
AMST 2020 Popular Culture in the United States, 1945 to Present DL
ART 3702 Special Topics in Art Studio (off campus)
ARTH 2600 Introduction to Art History: The Modern Era
ASIAN 2250 Introduction to Asian Religions
ASRC 1100–1101 Swahili (off campus)
BIOEE 2640 Tropical Field Ornithology (off campus)
BIOEE 2650 Tropical Field Ecology and Behavior (off campus)
COMM 2630 Organizational Writing
COMM 2720 Principles of Public Relations and Advertising DL
CRP 3850/5850 Special Topics (off campus)
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
ORIE 3150 Financial and Managerial Accounting

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, all with time left over for travel or a summer job.

Summer Session offers the practical benefits of fulfilling requirements, accelerating your degree, gaining personal and professional growth, or easing 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, picinic, 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, call 607 255–4987; e-mail cusce@cornell.edu; or visit our web site at www.summer.cornell.edu.

**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.

**African Studies**

ASRC 1104–1105 Elementary Arabic
ASRC 1106–2101 Intermediate Arabic
ASRC 1100–1101 Swahili
ASRC 2300 African Cultures and Civilizations

**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, 1945 to Present DL
AMST 2525 Islam in America
AMST 3128 America’s Changing Faces
AMST 3140 History of American Foreign Policy, 1912 to the Present
AMST 3141 Prisons DL

**Animal Science**

ANSC 1120 Sustainable Animal Husbandry
ANSC 2140 Captive Raptor Management and Propagation

**Anthropology**

ANTHR 2112 Cosmology of Native North America
ANTHR 2220 Field Course in Iroquois Archaeology
ANTHR 3415 Art in the Modern World
ANTHR 3799 Women in Asia: Sex and Gender in Cross-Cultural Perspective

**Applied Economics and Management**

AEM 2190 Introduction to Applied Portfolio Management
AEM 2200 Introduction to Business 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 1200 Ancient Peoples and Places
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 1110 Introduction to Architecture: Design Studio
ARCH 1300 An Introduction to Architecture: Lectures

Consult the Department of Architecture office for a complete list of summer design offerings including foreign study opportunities.

**Art**

ART 1101 Art as Experience
ART 1201 Introductory Painting
ART 1401 Introductory Sculpture
ART 1501–1503 Drawing I and II
ART 1550 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 2401 Sculpture II
ART 2601 Photography II
ART 2603 Color Photography
ART 3601 Photography III
ART 3702 Special Topics in Art Studio

**Asian Studies**

ASIAN 2225 Literature, Politics, and Genocide in Cambodia DL
ASIAN 2279 Chinese Mythology

See also “On-Campus Special Programs Roster” above for a list of Asian language offerings.

**Astronomy**

ASTRO 1105 An Introduction to the Universe
ASTRO 1106 Essential Ideas in Relativity and Cosmology

**Biological and Environmental Engineering**

BEE 3299 Sustainable Development DL

**Biological Sciences**

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**

BIOG 6020 Molecular Biology for Teachers
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**

BIOG 1107–1108 General Biology
BIONB 2210 Neurobiology and Behavior I: Introduction to Behavior
BIONB 4200 Topics in Neurobiology and Behavior

**Plant Biology**

BIOPL 2450 Plant Biology

**Shoals Marine Laboratory**

See course listings under Shoals Marine Laboratory in this catalog.

**Biology and Society**

BSOC 4471 Seminar in the History of Biology

**Biometry and Statistics**

BTRY 3010 Biological Statistics I
BTRY 6010 Statistical Methods I

**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

City and Regional Planning
CRP 4080/5080 Introduction to Geographic Information Systems (GIS) DL

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 2300 Contemporary Mass Communication
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

Comparative Literature
COML 1118 Life in an Age of Moral Complexity
COML 2360 Greek Mythology
COML 3730 Literature of the Outlaw

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

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 4750 Special Topics in Oceanography
EAS 7500 Satellite Remote Sensing in Biological Oceanography

Economics
ECON 1110 Introductory Microeconomics
ECON 1120 Introductory Macroeconomics
ECON 3130 Intermediate Microeconomic Theory (calculus)
ECON 3140 Intermediate Macroeconomic Theory (calculus)
ECON 4340 Financial Economics, Derivatives, and Risk Management

Engineering
Distribution Courses
ENGRD 2110 Computers and Programming
ENGRD 2210 Thermodynamics
ENGRD 2700 Basic Engineering Probability and Statistics
ENGRD 3220 Introduction to Scientific Computation

Systems Engineering
SYSEN 1100 Getting Design Right: A Systems Approach DL
SYSEN 6910 Project Management

The Engineering Cooperative Education Program offers a number of other engineering courses. Contact that office for more information.

English
ENGL 1131 FWS: Reading and Writing About . . . ?
ENGL 1132 FWS: The Personal Essay
ENGL 2050 Introduction to World Literatures in English
ENGL 2270 Shakespeare
ENGL 2800–2810 Creative Writing
ENGL 2880–2890 Expository Writing
ENGL 3640 Studies in United States Literature after 1950
ENGL 3710 Literature of the Outlaw
ENGL 3830 Narrative Writing
ENGL 3850 Verse Writing
ENGL 4810 Seminar in Writing
ENGL 4950/7950 Independent Study

English as a Second Language
ENGLF 1011 English as a Second Language

English for Later Bilinguals
ENGLB 1050 English for Later Bilinguals

Feminist, Gender, and Sexuality Studies
FGSS 3890 Women in Asia: Sex and Gender in Cross-Cultural Perspective

French
FREN 2090 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
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 1510–1520 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 4370 Italy and the Jews
HIST 6212 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 4526 Caribbean Dialogs

Hotel Administration
HADM 4441 Strategic Management

Human Development
HD 1150 Human Development
HD 1160 Human Development: Section
HD 2160 Adolescence and Emerging Adulthood
Human Ecology
HE 1000 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

Organizational Behavior
ILROB 1220 Introduction to Organizational Behavior

Social Statistics
ILRST 2100 Introductory Statistics
ILRST 5110 Statistical Methods for the Social Sciences DL

Information Science
INFO 2450 Psychology of Social Computing

Italian
ITAL 3270 Ancient/Modern Corpo-Realities

Landscape Architecture
LA 6000 Site Grading Workshop

Latin
LATIN 1203 Intensive Latin

Linguistics
LING 1111 American Sign Language I and II
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 1300 Mathematical Explorations
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 I
MATH 2930 Differential Equations for Engineers I
MATH 2940 Linear Algebra for Engineers I
MATH 5080 Mathematics for Secondary School Teachers

Mechanical and Aerospace Engineering
MAE 2120 Mechanical Properties and Selection of Engineering Materials
MAE 2210 Thermodynamics

Music
MUSIC 1105 Introduction to Music Theory
MUSIC 1421 Introduction to Digital Music
MUSIC 3121 Introduction to Conducting: Unraveling the Mystery
MUSIC 3621 Cornell Summer Symphony Orchestra

Natural Resources
NTRES 1101 Introduction to Environmental Studies

Near Eastern Studies
NES 1201–1202 Elementary Arabic
NES 1203–2200 Intermediate Arabic
NES 2525 Islam in America

Nepali
NEPAL 1101 Elementary Nepali
NEPAL 2201–2202 Intermediate Nepali Conversation
NEPAL 3301–3302 Advanced Nepali

Nutritional Sciences
NS 1150 Nutrition, Health, and Society

Philosophy
PHIL 1100 Introduction to Philosophy
PHIL 1450 Contemporary Moral Issues
PHIL 1512 Philosophy and Film
PHIL 1910 Introduction to Cognitive Science
PHIL 2200 Ancient Philosophy
PHIL 2310 Introduction to Deductive Logic

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 Introduction to 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

Spanish
SPAN 1230 Continuing Spanish

Statistical Science
STSCI 2100 Introductory Statistics DL

Theatre, Film, and Dance
Film Studies
FILM 3210 The Location of Italian Film History
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 2430 Hip-Hop, Hollywood, and Home Movies: Exploring Movement and Media
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 (call 607  
255-4987 or e-mail cusce@cornell.edu).
Institutional research on the environment, seeks to catalyze interdisciplinary and multi-
faceted research to address complex environmental issues. The facilities of this program include tools for
exploring the design and fabrication of novel nanoscale structures for electronic, 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. Information Assurance Institute. The institute’s activities are aimed at developing a science and technology base to enhance information assurance, reliability, security, and trustworthiness in networked information systems.

Institute for the Study of the Continents. This interdisciplinary organization promotes research in deep seismic exploration of the structure, composition, and evolution of the continents.

Intelligent Information Systems Institute. IISI seeks to stimulate research in computer- 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.

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.

COLLEGE OF ENGINEERING

ADMINISTRATION

W. Kent Fuchs, dean
David Gries, associate dean for undergraduate programs
Christopher K. Ober, associate dean for research and graduate studies
Richard Allmendinger, associate dean for diversity
Deborah Cox, assistant dean for strategic planning, assessment, and new initiatives
Betsy East, assistant dean for student services
Cathy Dowe, associate dean for administration
Tim Dougherty, 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, and 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.

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:

Alliance for Nanomedical Technologies. The alliance brings together collaborative teams of academic scientists and industrial affiliates to explore the design and fabrication of novel nanomedical devices.

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 the Environment. The center seeks to catalyze interdisciplinary and multi-institutional research on the environment, connect Cornell's environmental research capacity to needs around the world, and engage Cornell's scientific talent as new issues arise.

Cornell Center for Materials Research. CCMR is an interdisciplinary center, with substantial support from the National Science Foundation, that performs state-of-the-art materials research and provides sophisticated scientific measurement and characterization equipment.

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. Information Assurance Institute. The institute’s activities are aimed at developing a science and technology base to enhance information assurance, reliability, security, and trustworthiness in networked information systems.

Institute for the Study of the Continents. This interdisciplinary organization promotes research in deep seismic exploration of the structure, composition, and evolution of the continents.

Intelligent Information Systems Institute. IISI seeks to stimulate research in computer- 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.

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.
DEGREE PROGRAMS

Cornell programs in engineering and applied science lead to the degrees of bachelor of science (B.S.), master of engineering (with field designation) (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 (ISSS)—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. Kostrov.

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 2008–2009 edition of the Engineering Undergraduate Handbook.)

Course Requirement

<table>
<thead>
<tr>
<th>Course Category</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mathematics (major-specific)</td>
<td>15–16</td>
</tr>
<tr>
<td>2. Physics (major-specific)</td>
<td>8–12</td>
</tr>
<tr>
<td>3. Chemistry (major-specific)</td>
<td>4–8</td>
</tr>
<tr>
<td>4. First-year writing seminar</td>
<td>6</td>
</tr>
<tr>
<td>5. Technical writing*</td>
<td>3</td>
</tr>
<tr>
<td>6. Computing</td>
<td>5</td>
</tr>
<tr>
<td>7. Introduction to engineering (ENGR)</td>
<td>3</td>
</tr>
<tr>
<td>8. Two engineering distributions (ENGRD)</td>
<td>6–8</td>
</tr>
<tr>
<td>9. Liberal studies distribution (6 courses min.)</td>
<td>≥ 18</td>
</tr>
<tr>
<td>10. Advisor-approved electives</td>
<td>6</td>
</tr>
<tr>
<td>11. Major program</td>
<td></td>
</tr>
<tr>
<td>a. Major-required courses</td>
<td>≥ 30</td>
</tr>
<tr>
<td>b. Major-approved electives</td>
<td>9</td>
</tr>
<tr>
<td>c. Courses outside the major</td>
<td>9</td>
</tr>
<tr>
<td>12. Two semesters of physical education in the freshman year and demonstration of proficiency in swimming (university requirement)</td>
<td></td>
</tr>
</tbody>
</table>

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 5570. ORE majors: CHEM 2080, CS 2800, or MATH 3040, 3110, or 3560.

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 must take CHEM 2090 in the fall of their freshman year and CHEM 2080 in the spring semester. Students considering the Science of Earth Systems major or a health-related career such as medicine should take the CHEM 2090–2080 sequence.

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. ENGRC 3500 or 3550
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
   - CHEM 4320
   - MSE 4050 and 4060 (both)
   - MSE 4090 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 302, 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 2050 Dynamics
   - Majors in Engineering Physics may substitute AEP 3530 for ENGRD 2050.

4. Probability and statistics
   - ENGRD 2700 Basic Engineering Probability and Statistics
   - Majors in Electrical and Computer Engineering may substitute ECE 5100 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 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, Lab and Lecture
   - 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 (co-enrollment in CS 2111 highly recommended)
   - 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/student-services/academic-advising/index.cfm. Lists of additional approved courses and unacceptable courses are also available in Engineering Advising, 167 Olin Hall.

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.


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 (ENGRI)
  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 300 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 advising and academic counseling. Other student services offices located in Olin Hall are Engineering Learning Initiatives and Diversity Programs in Engineering (DPE) and the primary resources for academic counseling, 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 (ENGRI) course**
- **Two physical education courses**

*Students with an interest in pre-med (or other health-related careers), chemical engineering, or Science of Earth Systems 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**

<table>
<thead>
<tr>
<th>Biological Engineering</th>
<th>Courses and Minimum Grade Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>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 with grade of at least C– in all courses. (Also applies to transfer students).</td>
<td></td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>At most one grade below C– in chemistry, math, physics, and chemical engineering courses. GPA ≥ 2.2 in math, science, and engineering courses.</td>
</tr>
</tbody>
</table>

**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, 2111, and 2800. GPA ≥ 2.5 in MATH 1920 and CS 2800. Visit the CS undergraduate office web site for alternative affiliation criteria.

**Electrical and Computer Engineering**

At least C+ in MATH 2930, PHYS 2213, and one of ECE/ENGRD 2100, ENGRD 2210*, or ECE/ENGRD 2300. GPA ≥ 2.5 in (if completed): MATH 1920, 2930, 2940, PHYS 2213, ENGRD 2110, ECE/ENGRD 2590, 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 ENGRD 2510.

**Information Science, Systems, and Technology**

At least C in two of MATH 2940, CS 2110, and ORIE/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**

At least C– in required physics, chemistry, and math courses. At least C in ENGRD 2610 or ENGRD 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). For students entering prior to fall 2005, see affiliation requirements at www.mae.cornell.edu.

At least C in each of ENGRD 2700 and MATH 2900. GPA ≥ 2.0 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.
Most engineering majors have a corresponding department for information on minors offered on the student's transcript. Not all departments subject to limitations placed by the department in any college that offers them, Engineering Minors.

Discussion of this major in "Undergraduate education in scope and substance and should logically connected nonengineering area. The secondary area (≥ 16 credits), which may be any subject area offered by a school or department of the college, and an educationally related interdisciplinary area.

The dual-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 affiliated 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.

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."

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.

The Diversity Programs in Engineering office operates programs at the undergraduate, graduate, and postgraduate 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

The office of Engineering Learning Initiatives offers programs designed to enhance the undergraduate academic experience through peer education, cooperative 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 week-long 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 process 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 or research 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, 107 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 “Master of Engineering Degrees” 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’s departmental placement examinations, 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 Cornell Departmental 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 Cornell departmental exam for first-semester math.

First-year math (MATH 1920). AP credit may be earned by:

- a passing score on the Cornell departmental 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 Cornell departmental 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.

- 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 Cornell departmental 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 or a score of 4 or 5 on the AB exam, or
  - a passing score on the Cornell departmental 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 College Entrance Examination Board (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 College Entrance Examination Board (CEEB) AP test or by taking the Cornell Advanced Standing Examination (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.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>A or B</td>
<td>8</td>
</tr>
<tr>
<td>Chemistry</td>
<td>A</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics or Pure</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Mathematics</td>
<td>A, B, or C</td>
<td>4</td>
</tr>
<tr>
<td>Physics</td>
<td>A or B</td>
<td>4</td>
</tr>
</tbody>
</table>

A more detailed description of the college’s policies concerning advanced placement credit and its use in developing undergraduate programs may be found in the pamphlet Advanced Placement and Transfer Credit for First-Year Engineering Students, which may be obtained from Engineering Advising, 167 Olin Hall.

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 copy of their examination certificate to Engineering Advising, 167 Olin Hall. Those who wish to take departmental examinations should do so during Orientation Week; permission to take these tests after the start of fall-semester classes must be requested in a written petition to the college’s Committee on Academic Standards, Petitions, and Credit (ASPAC).

A more detailed description of the college’s regulations governing transfer credit may be found in the pamphlet Advanced Placement and Transfer Credit for First-Year Engineering Students as well as the Engineering Undergraduate Handbook, both available from Engineering Advising, 167 Olin Hall, and at www.engineering.cornell.edu/student-services/academic-advising/index.cfm.

Transfer Credit for Transfer Students

Transfer students may transfer up to 56 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,
3. Semester GPA
2. At least C– in the math course

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.

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 they were 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 in residence. Students who wish to transfer into the College of Engineering must spend at least four semesters in their engineering curriculum.

Students who wish to transfer into the College of Engineering may 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.

Leaves of Absence
A leave of absence may be voluntary, medical, 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...
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 intramural 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.

### 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.

### 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.

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.

**Medical leave:** Medical leaves are granted by the college only upon recommendation by a physician or therapist from Gannett Health Center. Such leaves are given for at least six months and up to two years 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).

**Rejoining the College**

Students 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**

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.

**Medical leave:** Medical leaves are granted by the college only upon recommendation by a physician or therapist from Gannett Health Center. Such leaves are given for at least six months and up to two years 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).

**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.
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.

**Basic Subjects**

**Credits**

- MATH 1910**, 1920, 2930, 2940
- Calculus for Engineers and Engineering Mathematics 16
- PHYS 1112, 2213
- 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
- Major-required courses 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 3350 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 (one course must be a BEE Capstone course and one course must be a BEE lab experience course):** (Engineering courses at 2000 level or above to bring the total of required plus engineering electives to complete 46 credits)
  - 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 biomedical 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 BEE 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:

**Semester 3**

**Credits**

- MATH 2930 Engineering Mathematics 4
- PHYS 2213 Physics II, Heat/Thermodynamics 4
- CHEM 3890 Physical Chemistry I (engineering distribution) 4
- ENGRD 2190 Mass and Energy Balances (engineering distribution) 3
- Liberal Studies Distribution 3

**Semester 4**

- MATH 2940 Linear Algebra for Engineers 4
- CHEM 3520 Fluid Mechanics 3
- CHEM 3900 Honors Physical Chemistry II (major) 6
- CHEM 2900 Introductory Physical Chemistry Laboratory (major) 6
- Biology elective* 3
- Liberal Studies Distribution 3

**Semester 5**

- CS 1130 or CS 1132 Transition to MATLAB 1
- CHEM 3570 Organic Chemistry for the Life Sciences 3
- CHEM 2510 Introduction to Experimental Organic Chemistry 2
- CHEM 3130 Chemical Engineering Thermodynamics 3
- CHEM 3240 Heat and Mass Transfer 3
- Liberal Studies Distribution 3

**Semester 6**

- Advanced science elective** 3
- CHEM 3010 Nonresident Lectures 1
- CHEM 3320 Analysis of Separation Processes 3
- CHEM 3720 Introduction to Process Dynamics and Control 2
- CHEM 3900 Reaction Kinetics and Reactor Design 3
- Liberal Studies Distribution 3

**Semester 7**

- CHEM 4320 Chemical Engineering Laboratory 4
- Electives*** 9
- Liberal Studies Distribution 3

**Semester 8**

- CHEM 4620 Chemical Process Design 4
- Liberal Studies Distribution 3
- Electives*** 3
- Approved elective 3

* Every student must complete one of the following options for the biology elective: (1) CHEM 2880 Biomedical 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. (5) 4 credits of a pre-med biology sequence: BIOL 1101 Biological Sciences, Lec (fall, 2 credits) and BIOL 1103 Biological Sciences, Lab (fall, 2 credits), BIOL 1102 Biological Sciences, Lec (spring, 2 credits) and BIOL 1104 Biological Sciences, Lab (spring, 2 credits), BIOL 1105 Introductory Biology (fall, 4 credits), BIOL 1106 Introductory Biology (spring, 4 credits), BIOL 1107 General Biology (summer, first half of eight-week session, 4 credits) or BIOL 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: BIOMI 3500 Principles of Biochemistry, Individual Instruction (fall or spring, 4 credits) or BIOMI 3330 Principles of Biochemistry: Proteins, Metabolism, and Molecular Biology (summer
Admission Requirements

Students planning to affiliate with this major must complete ENGRD 2020 Mechanics of Solids (or, for students following the Environmental Concentration, ENGRD 2510) with at least C-. It is strongly recommended that ENGRD 2020 be taken as an engineering distribution course 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 2100 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. (Students interested in the Environmental Concentration should follow the course requirements for the Environmental Engineering Major and should refer to the CEE Undergraduate Handbook for requirements specific to CE majors. CE majors should take CHEM 3410.)

Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGRD 2030 Dynamics* or CHEM 4780 Structural Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>ENGRD 3200 Engineering Computation*</td>
<td>3</td>
</tr>
<tr>
<td>CEE 3040 Uncertainty Analysis in Engineering†</td>
<td>4</td>
</tr>
<tr>
<td>CEE 3290 Engineering Economics and Management</td>
<td>3</td>
</tr>
<tr>
<td>CEE 3310 Fluid Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>CEE 3410 Introduction to Geotechnical Engineering and Analysis</td>
<td>4</td>
</tr>
<tr>
<td>CEE 3510 Environmental Quality Engineering**</td>
<td>3</td>
</tr>
<tr>
<td>CEE 3610 Introduction to Transportation Engineering**</td>
<td>3</td>
</tr>
<tr>
<td>CEE 3710 Structural Modeling and Behavior</td>
<td>4</td>
</tr>
</tbody>
</table>

Additional requirements include a minimum major-approved elective (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 ENGRG or approved communications courses. If the technical communications course also fulfills another requirement (liberal studies major-approved elective, etc.), then an additional major-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 3520 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. Students may also substitute CEE 4610 for CEE 3510 if they also take two of these three courses: CEE 4650, CEE 4640 and 4650. However, then CEE 4610 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., ENGRG 4700 Peer Teaching in Engineering or 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 by 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, 255-0882, ww.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 in algorithms, data structures, logic, programming languages, scientific computing, systems, and theory. Electives in artificial intelligence, computer graphics, computer vision, databases, multimedia, and networks are also possible. Requirements include:
- MATH 1910, 1920, and 2940
- three courses in introductory computing, either CS 1110, CS 1132, CS 2110 or CS 1112, CS 1030, CS 2110
- a 1-credit project (CS 2111)
- a seven-course computer science core (CS 2600, 3110, 3410, or 4420; one of 3220, 4210, or 4220, 3810, 4410, and 4820)
- two 4000+ level computer science electives (CS 4999 not allowed)
- a computer science project course (CS 4121, 4211, 4411, 4450, 4621, 4701, 5150, 5410, or 6670)
- a math elective course (e.g., ENGRD 2700, MATH 2930, MATH 3000+, TAM 3100)
- two 3000+ level courses (major-approved electives) that are technical in nature
- a three-course specialization in a topic area other than computer science, all numbered 3000 level or greater

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.

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 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 3030 Electromagnetic Fields and Waves 4

ECE 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**

(Credit minimum in the following categories)

Advanced ECE electives† (six lecture courses) 9

Outside ECE electives‡ (two 400-level electives) 9

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 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 Electrical and Computer Engineering Web 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 ≥ 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 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.

**Electrical and Computer 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:

Students must apply during the first three weeks of the sixth semester. They must achieve at least a B in the three required courses taken for honors designation.

**Honors Seminar**

Prospective honors students must take an honors seminar in the spring semester of their junior year, for a letter grade and 2 credits. The honors seminar consists of a weekly series of introductory research lectures by ECE faculty members. Each honors seminar enrollee will write two short papers on topics covered in the lecture series. Many ECE faculty members will give a lecture or short series of lectures as part of the honors seminar.

**Honors Project**

A student in the honors program is required to accumulate at least 3 credit hours from a senior-year honors project with an ECE faculty member, consisting of either design, research, or directed reading at the 400 level. All honors projects emphasize the development of communication skills. Design- and reading-oriented honors projects explicitly require a written submission summarizing and concluding the project.

**Additional Course Work**

At least 3 credit hours are required of advanced (senior level) ECE course work that has at least a 3.000-level prerequisite. These credit hours are in addition to any credit hours required as part of the ECE major.

The requirement for at least 9 credits over and above the 130 credits required for a B.S.
degree means that an honors degree requires 139 credit hours.

**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 in 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 to advanced study in all those 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 engineering physics (EP) major is designed for students who want to pursue careers in 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 to advanced study in all those 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 ENGR/AEP 1110 Lasers and Photonics; ENGR/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); PHYS 4110 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 1010 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:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEP 3330 Mechanics of Particles and Solid Bodies</td>
<td>4</td>
</tr>
<tr>
<td>AEP 3550 Intermediate Electromagnetism</td>
<td>2</td>
</tr>
<tr>
<td>AEP 3560 Intermediate Electrodynamics</td>
<td>4</td>
</tr>
<tr>
<td>AEP 3610 Introductory Quantum Mechanics</td>
<td>2</td>
</tr>
<tr>
<td>AEP 3620 Intermediate Quantum Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>AEP 3630 Electronic Circuits</td>
<td>4</td>
</tr>
<tr>
<td>AEP 4230 Statistical Thermodynamics</td>
<td>4</td>
</tr>
<tr>
<td>AEP 4340 Continuum Physics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 4410 Advanced Experimental Physics</td>
<td>4</td>
</tr>
<tr>
<td>AEP 3210 Mathematical Physics I</td>
<td>4</td>
</tr>
<tr>
<td>AEP 3220 Mathematical Physics II</td>
<td>4</td>
</tr>
</tbody>
</table>

Six major-approved electives (18–23 credits), of which five must be technical upper-level courses (300 or above).

Total major credits=58 credit hours minimum

1. 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 take 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/PHY 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/PHY 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/PHY 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 student 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 with 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.

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.

**Engineering Physics 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:

1. At least 8 credits of major-approved electives at the 4000 level or higher with at least A– in each, not counting credits given for item 2.

2. Two semesters of AEP 4900 or an equivalent course, with at least 2 credits the first semester and 4 credits the second. The student will complete an independent research project or senior thesis under the supervision of an engineering or science faculty member.

The level of work required for successful completion is to be determined by a faculty committee. The student must complete an independent research project or senior thesis under the supervision of an engineering or science faculty member.

The level of work required for successful completion is to be determined by a faculty committee. The student must complete an independent research project or senior thesis under the supervision of an engineering or science faculty member.

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.

**Procedures**

Before enrolling in AEP 4900 or the equivalent, submit a brief proposal outlining the topic and scope of the project or thesis and an honors advisor'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 with a list of deficiencies. The proposed project or thesis is to consist of a research, development, or design project and must go beyond a literature search. 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. Following completion of the written report, an oral report is to be presented to an audience consisting of the faculty supervisor, the chair of the Honors Committee, and at least one other departmental faculty member, along with the other honors candidates. A copy of the final report is to be given to the chair of the AEP Honors Committee. The final research project course grade will be assigned by the faculty supervisor after consultation with the chair of the Honors Committee. At least A– is required for successful completion of the honors requirement.

ENVIRONMENTAL ENGINEERING
Offered jointly by the Department of Biological and Environmental Engineering and the School of Civil and Environmental Engineering.


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

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1910, 1920, 2930, 2940</td>
<td>16</td>
</tr>
<tr>
<td>PHYS 1112, 2213</td>
<td>8</td>
</tr>
<tr>
<td>CHEM 2000 and 1570</td>
<td>7</td>
</tr>
<tr>
<td>CS 1110, CS 1112, or BEE 1510†</td>
<td>5</td>
</tr>
<tr>
<td>followed by CS 1132 or CS 1130</td>
<td></td>
</tr>
</tbody>
</table>

Introduction to engineering†††

<table>
<thead>
<tr>
<th>ENGRD 1130 Water Treatment Design (recommended), or BEE 1200 The BEE Experience* (required for students matriculating in CALS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

Engineering distribution courses†

| ENGRD 2510 Engineering for a Sustainable Society (required) | 3       |
| ENGRD 2020, 3200, or 2210 are recommended or BIOG 1101–1105, BIOG 1105, BIOG 1107 may be used) | 3–4     |
| BIOG 1109 Introductory Biology** (students may also use BIOG 1101–1103, BIOG 1102–1104, BIOG 1105, BIOG 1106, BIOG 1107, or BIOG 1110 to satisfy the biology requirement) | 3–4     |
| ENGRD 2020 Mechanics of Solids** | 4       |
| ENGRD 3200 Engineering Computation** | 3       |
| ENGRD 2210 Thermodynamics** | 3       |
| CEE 3040 Uncertainty Analysis in Engineering*** | 4       |
| CEE 3310 Fluid Mechanics | 4       |
| Earth Science (one from the following list): | 3–4     |
| CEE 3410 Introduction to Geotechnical Engineering and Analysis |         |
| or EAS 3030 Introduction to Biogeochemistry |         |
| or CSS 3650 Environmental Chemistry: Soil, Air, and Water |         |
| or BEE 3710 Physical Hydrology for Ecosystems |         |
| or CEE 3510 Environmental Quality Engineering | 3       |
| or CEE 4510 Microbiology for Environmental Engineering† | 3       |
| Laboratory Course (one from the following list): |         |
| CEE 4530 Lab Research in Environmental Engineering | 3       |
| or BEE 2270 Water Sampling and Measurement |         |
| or BEE 4730 Watershed Engineering |         |
| or CEE 4370 Experimental Methods in Fluid Dynamics |         |
| BEE 4750 Environmental Systems Analysis | 3–4     |
| Engineering Economics: | 3–4     |
| CEE 3230 Engineering Economics and Management |         |
| or BEE 4890 Entrepreneurial Management for Engineers |         |

Electives

| Technical communications course††† (ENGRC 3350 or 3500, COMM 2600, 2630, or 3520 in liberal studies category; or BEE 4930 taken with BEE 4730 or BEE 4980 or BEE 4530) | 4–5     |

Major-required courses

<table>
<thead>
<tr>
<th>Major Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOG 1109 Introductory Biology** (students may also use BIOG 1101–1103, BIOG 1102–1104, BIOG 1105, BIOG 1106, BIOG 1107, or BIOG 1110 to satisfy the biology requirement)</td>
<td>3–4</td>
</tr>
<tr>
<td>ENGRD 2020 Mechanics of Solids**</td>
<td>4</td>
</tr>
<tr>
<td>ENGRD 3200 Engineering Computation**</td>
<td>3</td>
</tr>
<tr>
<td>ENGRD 2210 Thermodynamics**</td>
<td>3</td>
</tr>
<tr>
<td>CEE 3040 Uncertainty Analysis in Engineering***</td>
<td>4</td>
</tr>
<tr>
<td>CEE 3310 Fluid Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>Earth Science (one from the following list):</td>
<td>3–4</td>
</tr>
<tr>
<td>CEE 3410 Introduction to Geotechnical Engineering and Analysis</td>
<td></td>
</tr>
<tr>
<td>or EAS 3030 Introduction to Biogeochemistry</td>
<td></td>
</tr>
<tr>
<td>or CSS 3650 Environmental Chemistry: Soil, Air, and Water</td>
<td></td>
</tr>
<tr>
<td>or BEE 3710 Physical Hydrology for Ecosystems</td>
<td></td>
</tr>
<tr>
<td>or CEE 3510 Environmental Quality Engineering</td>
<td>3</td>
</tr>
<tr>
<td>or CEE 4510 Microbiology for Environmental Engineering†</td>
<td>3</td>
</tr>
<tr>
<td>Laboratory Course (one from the following list):</td>
<td></td>
</tr>
<tr>
<td>CEE 4530 Lab Research in Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>or BEE 2270 Water Sampling and Measurement</td>
<td></td>
</tr>
<tr>
<td>or BEE 4730 Watershed Engineering</td>
<td></td>
</tr>
<tr>
<td>or CEE 4370 Experimental Methods in Fluid Dynamics</td>
<td></td>
</tr>
<tr>
<td>BEE 4750 Environmental Systems Analysis</td>
<td>3–4</td>
</tr>
<tr>
<td>Engineering Economics:</td>
<td>3–4</td>
</tr>
<tr>
<td>CEE 3230 Engineering Economics and Management</td>
<td></td>
</tr>
<tr>
<td>or BEE 4890 Entrepreneurial Management for Engineers</td>
<td></td>
</tr>
</tbody>
</table>

Three Environmental design electives chosen from the list of approved courses 9-credit minimum

Two major-approved engineering electives to complete total credit requirement‡‡ 6
First-year writing seminar 6
Two approved electives 6
Liberal studies 18
Total credits (minimum) 126

**COE matriculated students must complete one ENGR IXXX course their first year. CALS matriculated students may complete BEE 1510 and BEE 1200 to meet the requirement.

*BEE 1510 and 1200 together (5 credits) satisfy the ENGR requirement for CALS–matriculated first-year students. Students using BEE 1200 and BEE 1510 to satisfy the ENGR requirement must make up the 2-credit difference with engineering course work.

***Students using this course as a second engineering distribution must take an additional major-approved elective. BIOG 1090 is not an engineering distribution course.

††ENGRI 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 must complete two ENGR courses.

†††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.

‡‡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 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. 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


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 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 Computers and Programming is required for the major and is recommended as the second engineering distribution course.

Major program

<table>
<thead>
<tr>
<th>Core courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability, Statistics, and Optimization</td>
<td></td>
</tr>
<tr>
<td>ORIE 3300 Optimization I</td>
<td>3</td>
</tr>
<tr>
<td>ORIE 3500 Engineering Probability and Statistics II</td>
<td>3</td>
</tr>
</tbody>
</table>

Information Systems

INFO 2300 Intermediate Design and Programming for the Web 3
ORIE 3800 Information Systems and Analysis 3
INFO 3300 Data-Driven Web Applications 3

ECON 3010 or 3130 Microeconomics 3
One of:
ILR 1750 Behavior, Values, and Performance 3
INFO 2450 Psychology of Social Computing 3
ORIE 3510 Introductory Engineering Probability and Statistics I 3
ENGRD 3550 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 (INFO 4000 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 (INFO 4000 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

INFO 3720 Explorations in Artificial Intelligence
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 5120 Supply Chain Management

Area V. Human-Centered Systems

PSYCH/COGST 3420 Human Perceptions: Applications to Computer Graphics, Art, and Visual Display*
INFO 4350 Human-Computer Interaction Design
PSYCH 3470 Psychology of Visual Communications
INFO 3560 Technology in Collaboration
PSYCH 3800 Social Cognition*
PSYCH 4130 Information Processing: Conscious and Unconscious
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.
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 enrolling in 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:

1. ENGRD 2610 Mechanical Properties of Materials: From Nanodevices to Superstructures or ENGRD 2620 Electronic Materials for the Information Age
2. 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 3050 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 4050/4050 Senior Materials Lab I or Senior Thesis I

MECHANICAL ENGINEERING

Offered by the Sibley School of Mechanical and Aerospace Engineering

Contact: 108 Upson Hall, 255-3573, mae@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
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
- Energy and the environment, MAE 4020, 4230, 4490, 4550, 4590, 5010, 5430
- Engineering materials, MAE 3120, 3130, 4040, 4140, 4550, 4640, 4700, 5130
- Mechanical systems and design, MAE 3790*, 4150, 4170, 4700, 4770, 4800, 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, 4230, 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 disciplines (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:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAM 3100</td>
<td>Thermodynamics</td>
</tr>
<tr>
<td>ENGRD 2700</td>
<td>Thermo-fluids Engineering</td>
</tr>
<tr>
<td>CEE 3040</td>
<td>Mechanics and Structures</td>
</tr>
<tr>
<td>ENGRD 3200</td>
<td>Heat Transfer</td>
</tr>
<tr>
<td>TAM 4170</td>
<td>Manufacturing Processes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAE 4291</td>
<td>Supervised Senior Design Experience</td>
</tr>
<tr>
<td>MAE 4280</td>
<td>Engineering Design</td>
</tr>
<tr>
<td>MAE 4272</td>
<td>Fluids/Heat Transfer Laboratory</td>
</tr>
<tr>
<td>MAE 4280</td>
<td>Engineering Design</td>
</tr>
<tr>
<td>MAE 4291</td>
<td>Supervised Senior Design Experience</td>
</tr>
</tbody>
</table>

Advisors may approve such courses as advisor-approved electives.

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 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: 205 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 ORIE 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 30-40 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 considerations should be considered.

1. MATH 2940 (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; this material is recommended for students who intend to do advanced (Ph.D.-level) study in operations research or a related field. Early consultation with a faculty member or the associate director for undergraduate studies may be helpful in making appropriate choices.

The required courses for the OR&E major and the typical terms in which they are taken are as follows:

<table>
<thead>
<tr>
<th>Semester 2 or 3</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGRD 2110 Computers and Programming</td>
<td>3</td>
</tr>
<tr>
<td>ENGRD 2700 Basic Engineering Probability and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Semester 4</td>
<td></td>
</tr>
<tr>
<td>ORIE 3120 Industrial Data and Systems Analysis*</td>
<td>4</td>
</tr>
<tr>
<td>Semester 5</td>
<td></td>
</tr>
<tr>
<td>ORIE 3300 Optimization I</td>
<td>4</td>
</tr>
<tr>
<td>ORIE 3500 Engineering Probability and Statistics II</td>
<td>4</td>
</tr>
<tr>
<td>Behavioral Science (Organizational Behavior)?</td>
<td>3</td>
</tr>
<tr>
<td>Liberal elective</td>
<td>3</td>
</tr>
<tr>
<td>Advisor-approved elective</td>
<td>3</td>
</tr>
<tr>
<td>Semester 6</td>
<td></td>
</tr>
<tr>
<td>ORIE 3150 Financial and Managerial Accounting (may be taken in semester 4)</td>
<td>4</td>
</tr>
<tr>
<td>ORIE 3310 Optimization II</td>
<td>4</td>
</tr>
<tr>
<td>ORIE 3510 Introductory Engineering Stochastic Processes I</td>
<td>4</td>
</tr>
<tr>
<td>Major-approved elective</td>
<td>3</td>
</tr>
<tr>
<td>Liberal elective</td>
<td>3</td>
</tr>
</tbody>
</table>

*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.

†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, ILROR 1220, and 1750, ILROR 1115, ENGRG 3550 (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
- Three upper-level ORIE electives as described below

Two major-approved electives (at least 3 credits must be outside ORIE)

Liberal electives

One advisor-approved elective

Available ORIE electives are as follows:

- Manufacturing and distribution systems: ORIE 4150, 4800, 4810, 4850, 5100, 5120, 5122, 5126 and JGSM MBA 6410
- Optimization methods: ORIE 4154, 4300, 4320, 4350, 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 ORIE 3300 and 3510, in particular) may not be taken until a grade of C– or better 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 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.

- 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

Offered by the Department of Earth and Atmospheric Sciences

Contact: 2124 Snee Hall, 255-5466, www.eas.cornell.edu

We live on a planet with finite resources and a finite capacity to recover quickly from human-induced environmental stresses. Natural hazards such as earthquakes, hurricanes, and volcanic eruptions can alter the course of history with little prior warning. As the human population grows, understanding the Earth and its resources becomes progressively more important to both future policymakers and ordinary citizens, who must find new sources of energy and sustain the quality of our environment. Because the human need to understand the Earth is so pervasive and the earth system is so multifaceted, the major covers the spectrum of modern earth sciences, including the structure, composition, and evolution of our planet; the planetary processes producing weather and climate; and processes on and near the earth’s surface where the interactions of water, life, rock, and air produce our planetary environment.

The major is built on a rigorous introduction to this broad spectrum plus a concentration chosen by the student to obtain expertise in an area of interest and relevance to the student’s career plans.

The major prepares students for a number of career paths including further graduate study in geology, geophysics, geochemistry, biogeochemistry, atmospheric sciences, ocean sciences, hydrology, or environmental sciences and engineering. Careers dealing with energy and mineral resources, natural hazards, weather and climate, ocean sciences, or environmental sciences are possible in academic research groups, governmental agencies, and the private sector. The major also prepares students for careers in environmental policy, law or medicine, science in the media, and K–12 science teaching.

Requirements for the Major

This major has the same requirements as the Science of Earth Systems major in other Cornell undergraduate colleges. The major includes strong preparation in math, physics, chemistry, and biology. A second semester of chemistry (CHEM 2080 or CHEM 1570) is required with PHYS 2214 optional. Two semesters of biology are required (either BIOG 1101/1103–1102/1104 or BIOG 1109–1110). A second semester of biology can be replaced by CHEM 1570 if CHEM 2080 is also selected.

A required introductory course in earth science is satisfied by EAS 2200. 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

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 geology, 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.

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 (CEE)
- Engineering Statistics (ORIE)
- Environmental Engineering (BEE/CEE)
- Geological Sciences (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:

1. **Rules for ME majors:**
   - a. Select at least four courses from group A, of which you must choose MAE 3050 or MAE 3060 (or both).
   - b. Select at most two courses from group B. No courses from group C may be used.
   - c. 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.

2. **Rules for other majors:**
   - a. Select at least four courses from group A, of which you must choose MAE 3050 or MAE 3060 (or both).
   - b. Select at most two courses from group B.
   - 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/EE 4150 GPS: Theory and Design

#### 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/CHME 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 2110/ENGRD 2100 or PHYS 3360

### MINOR: APPLIED MATHEMATICS

**Offered by the Department of Theoretical and Applied Mathematics**

Contact: Richard Rand, 207 Kimball Hall, 255-7145, rhr2@cornell.edu, www.tam.cornell.edu/Undergrad.html

All undergraduates 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:

- a. At most one course from any one of the groups 1, 2, 3, or 4.
- b. At least three courses from groups 5 and 6.

**Academic standards:** At least C in each course in the minor.

#### Requirements

1. **Analysis**
   - AEP 3210 Mathematical Physics I
   - MATH 3210 Manifolds and Differential Forms
   - MATH 4200 Differential Equations and Dynamical Systems
   - TAM 3100 Introduction to Applied Mathematics I

2. **Computational Methods**
   - CS 4210 Numerical Analysis
   - ENGRD 3220 Introduction to Scientific Computation
   - ENGRD 3200 Engineering 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 Modeling of Structural Systems
   - CHME 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 5700 Applied Mechanics
  - TAM 5700 Intermediate Dynamics

Also, you may choose from:

- CS 3810 Introduction to Theory of Computing
- CS 4510 Introduction to Computational Biophysics
- CS 4820 Introduction to the Analysis of Algorithms
- ORIE 3310 Optimization II
- ORIE 4330 Discrete Models
- ORIE 4530 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:
  - a. MATH 3230 or 4200, if any course from group 1 is chosen
  - b. MATH 4710, if any course from group 3 is chosen
  - c. MATH 4220, if TAM 3110 or AEP 3220 is chosen from group 5
  - d. 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 $\geq 2.0$ 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:

BEE 3500 Biological and Environmental Transport Processes (3 credits); required

I. Biology Foundation (at least one but no more than two courses)
   BIOBM 3500 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 4590)
BME 5650 Biomechanical Systems—Analysis and Design (also MAE 5650)
CHEM 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 Bioprocesses
BEE 4680 Metabolic Engineering
CHEM 3000 Quantitative Chemistry (does not count for Engineering credit)
CHEM 3320 Analysis of Separation Processes
CHEM 5420 Bioanalytical Techniques

Biocatalysis
BEE 3710 Physical Hydrology for Ecosystems
BEE 4530 Principles of Aquaculture
BEE 4710 Introduction to Groundwater (also EAS 4710)
BEE 4730 Watershed Engineering
BEE 4780 Ecological Engineering
BEE 6510 Bioremediation Engineering
BEE 4720 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 in any college are eligible to participate in this minor. Students may participate in only one of these areas of interest: the biological engineering minor or the biomedical engineering minor.

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 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 (18 credits) from the five categories listed below; two courses 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 ENGRI 1310: Introduction to Biomedical Engineering
A score of 4 on (CEEB) Advanced Placement Biology and BLOG 1104 or BLOG 1104 Biological Sciences, Laboratory
BLOG 1101, 1102, 1103, and 1104 Biological Sciences
BLOG 1105 and 1106 Introductory Biology
BLOG 1107 and 1108 General Biology
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

Category 3. Molecular and cellular biomedical engineering
AEP 2520/ENGRD 2520 The Physics of Life
BEE 3600/BME 3600 Molecular and Cellular Biomeengineering
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/CHEM 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
CHEM 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 4590 Biosensors and Bioanalytical Techniques
BME 4110 Science and Technology Approaches to Problems in Human Health
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 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 (18 credits) chosen as follows:
1. Required courses
CS/ENGRD 2110 Computers and Programming
One of the following:
CS/ENGRD 3220 Introduction to Scientific Computing
CS 4210 Numerical Analysis and Differential Equations, or
CS 4220 Numerical Analysis: Linear and Nonlinear Equations
One of the following:
CS 3410 Systems Programming, or
CS 3420/ECE 3120 Computer Organization
2. Additional courses
Three 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. 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, but MSE students must receive prior written approval from both MSE and ECE, via petition. 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.

Other related courses
CEE 5950 Construction Planning and Operations
*Other CEE courses may be approved by petition in advance
**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 3240 Engineering Economics and Management
   - or ORIE 4150 Economic Analysis of Engineering Systems
   - ORIE 3150 Financial and Managerial Accounting
   - or ENGRD 2700 Basic Engineering Probability and Statistics
   - or CEE 3100 Introduction to Probability and Random Signals

2. Additional courses—choose any three:
   - CEE 4060 Civil Infrastructure Systems
   - CEE 4920 Engineers for a Sustainable World: Engineering in International Development
   - CEE 5930 Engineering Management Methods
   - CEE 5940 Economic Methods for Engineering Management
   - CEE 5950 Construction Planning and Operations
   - CEE 5960 Management Issues in Forensic Engineering
   - CEE 5970 Risk Analysis and Management
   - CEE 5980 Introduction to Decision Analysis
   - NBA 5070 Entrepreneurship for Scientists and Engineers
   - or MAE/ENGRG 4610/ORIE 4152 Entrepreneurship for Engineers
   - or BEE 4890 Engineering Entrepreneurship, Management and Ethics

   ORIE students must substitute NCC 5560 or NBA 5000 for ORIE 3500

2. Additional courses—choose any three:
   - CEE 4520 Water Supply Engineering
   - BEE/ENGRD 2510 Engineering for a Sustainable Society
   - or BEE/ENGRD 2510 Engineering for a Sustainable Society
   - or ENGRD 2100 Introduction to Decision Analysis
   - or ENGRD 2100 Introduction to Decision Analysis
   - or ENGRD 2100 Introduction to Decision Analysis

   Students affiliated with all majors except environmental engineering are eligible to participate in this minor. Students majoring in biological engineering or civil engineering are eligible if they are not following the environmental concentration offered by those majors. Eligible 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 ≥ 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 CEE 3100 Introduction to Probability and Random Signals

2. Additional courses—choose any four:
   - ORIE 3150 Financial and Managerial Accounting
   - ORIE 4150 Economic Analysis of Engineering Systems
   - ORIE 4152 Entrepreneurship for Engineers
   - or BEE 4890 Engineering Entrepreneurship, Management and Ethics
   - or ENGRD 2100 Introduction to Decision Analysis
   - or ENGRD 2100 Introduction to Decision Analysis
   - or ENGRD 2100 Introduction to Decision Analysis
   - or ENGRD 2100 Introduction to Decision Analysis
   - or ENGRD 2100 Introduction to Decision Analysis
   - or ENGRD 2100 Introduction to Decision Analysis
   - or ENGRD 2100 Introduction to Decision Analysis
   - or ENGRD 2100 Introduction to Decision Analysis
   - or ENGRD 2100 Introduction to Decision Analysis

   Students affiliated with all majors except environmental engineering are eligible to participate in this minor. Students majoring in biological engineering or civil engineering are eligible if they are not following the environmental concentration offered by those majors. Eligible 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 ≥ 2.0 for all courses in the minor.

**Requirements**

At least six courses (≥ 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
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 2750/CS 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/PSCYH 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 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.

**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:** one course
- **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**

- INFO 1700 Computation, Information, and Intelligence
- 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 4520 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 2500. 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 Psychology of Social Computing
- PSYCH 2800 Introduction to Social Psychology
- 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 in Collaboration
- ECON 3010 Microeconomics*
- SOC 3040 Social Networks and Social Processes
- ECON 3130 Intermediate Microeconomic Theory*
- INFO 3200 New Media and Society
- AEM 3220 Technology, Information, and Business Strategy*
- 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*

**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 Technology, Information, and Business Strategy*
- 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*

**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 2600 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, CHEM, 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, 255-5375, 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: 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. 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. These may include, e.g., additional courses from the above lists, undergraduate research courses, and outdoor field courses.

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. 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.


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 www.engr.cornell.edu/grad/MEng.
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 in both programs, finishing up their B.S. degree and also doing their first semester of the M.Eng. program.

Master of Engineering Minors and Concentrations
The following M.Eng. minors and concentrations are offered:

Minors
- bioengineering
- manufacturing
- engineering management
- systems engineering

Concentrations
- information technology
- financial engineering
- applied operations research
- data mining and analytical marketing
- technology management for ECE
- semester in strategic operations
- complex system development
- nanosystems

A table indicates which minors and concentrations are available to students and contains detailed descriptions: www.engineering.cornell.edu/student-services/rgs/upload/MEng-Minors-and-Concentrations-Grid.pdf.

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 M.Eng. 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. M.B.A.) as well as an application to participate in the Knight Scholarship Program.

Contact BGS 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, aeronautics, propulsion, fluid mechanics, thermodynamics, structures, and materials. 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 chair of the MAE Master of Engineering committee. An individual student’s curriculum includes a 4- to 8-credit design course, a minimum of 12 credits in aerospace engineering or a closely related field, 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 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 MAE master of engineering chair.

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 (BIOMEDICAL ENGINEERING)
Offered by the Department of Biomedical Engineering
Contact: 207 Riley-Robb Hall, 255-2173, 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 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 coursework (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.

3. Knowledge of business practices and techniques for pollution abatement and control. This knowledge may have already been acquired by students as undergraduates. If not, then CHEM 5720 or CHEM 6610 or other courses covering these topics are 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.

2. A minimum of 3 credits of an individual or group project, CHEM 5650.

MASTER OF ENGINEERING (CHEMICAL ENGINEERING)
Offered by the School of Chemical and Biomolecular Engineering
Contact: 358 Olin Hall, 255-4550, www.cheme.cornell.edu
This degree is awarded at the end of one year of graduate study with successful completion of 30 credits of required and elective courses in technical fields including engineering, math, chemistry, physics, and business administration. Some courses emphasize design and optimization based on the economic factors that affect design alternatives for processes, equipment, and plants. General admission and degree requirements are described at the beginning of the section “Master of Engineering Degrees.”

Specific requirements include

1. 12 credits in CHEME courses distributed among chemical and biomolecular engineering fundamentals. One required from among CHEM 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, and 6610).

2. A minimum of 3 credits of an individual or group project, CHEM 5650.

3. Knowledge of business practices and techniques for pollution abatement and control. This knowledge may have already been acquired by students as undergraduates. If not, then CHEM 5720 or CHEM 6610 or other courses covering these topics are required.

MASTER OF ENGINEERING (COMPUTER SCIENCE)
Offered by the Department of Computer Science
Contact: 322 Upson Hall, 255-8720, www.ccs. 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 systems design and implementation in major 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. In fact, slightly under half the courses may be taken outside the computer science department (many students choose to take several business administration courses).

Project work, which may be done individually or in a small group, can often be associated with ongoing research in the Department of Computer Science in one of the areas listed above.

Cornell seniors may use the early admission option to effectively co-register for the M.Eng. program while completing the undergraduate degree. This option can be started in either the fall or spring semester. It applies 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.

Undergraduates majoring in computer science may be interested in a program that can lead, in the course of six years, to B.S., M.Eng. (Computer Science), and M.B.A. degrees. See “Master of Engineering Degrees.”

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 but 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 11 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:

1. Three core courses: These include: CEE 5800 Project Management, CEE 5930 Engineering Management Methods, and CEE 5910 Management Project.
2. Two focus courses, from a list that includes CEE 5960, CEE 5970, CEE 5980, and CEE 6900.
3. Two managerial breadth courses, including one in finance/accounting and one focused on behavior.
4. Three disciplinary or functional 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: 212 Kimball Hall, 255-0988, www.tam.cornell.edu/meng1.html

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 such as the finite element method.

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 Cadby
5. Fracture and Reliability—Hui, Phoenix, Zehnder
6. Response Theory—K. Bingham Cadby
7. Nuclear Reactor Theory—K. Bingham Cadby

Engineering Mechanics

Fall semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAM 6530</td>
<td>Solid Mechanics I</td>
<td>4</td>
</tr>
<tr>
<td>or TAM 6740</td>
<td>Nonlinear Vibrations</td>
<td>3</td>
</tr>
<tr>
<td>TAM 5700</td>
<td>Intermediate Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>or TAM 6100</td>
<td>Methods of Applied Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>TAM 8000</td>
<td>Seminar</td>
<td>1</td>
</tr>
</tbody>
</table>

Spring semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEE 7770</td>
<td>Special Topics in Structural Engineering</td>
<td>3</td>
</tr>
<tr>
<td>or TAM 7130</td>
<td>Fracture</td>
<td>3</td>
</tr>
<tr>
<td>TAM 6720</td>
<td>Introduction to the Finite Element Method</td>
<td>3</td>
</tr>
<tr>
<td>MSE 5820</td>
<td>Mechanical Properties of Material, Processing and Design</td>
<td>4</td>
</tr>
<tr>
<td>MAE 5700</td>
<td>Finite Element Analyses for Mechanical and Aerospace Design</td>
<td>4</td>
</tr>
<tr>
<td>TAM 8000</td>
<td>Seminar</td>
<td>1</td>
</tr>
</tbody>
</table>

Applied Mathematics and Modeling

Fall semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAM 5700</td>
<td>Intermediate Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>TAM 6100</td>
<td>Methods of Applied Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>CEE 7710</td>
<td>Stochastic Mechanics in Science and Engineering</td>
<td>3</td>
</tr>
<tr>
<td>TAM 8000</td>
<td>Seminar</td>
<td>1</td>
</tr>
</tbody>
</table>

Spring semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAM 5700</td>
<td>Intermediate Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>TAM 6110</td>
<td>Methods of Applied Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>TAM 6710</td>
<td>Hamiltonian Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>or TAM 6740</td>
<td>Nonlinear Vibrations</td>
<td>3</td>
</tr>
</tbody>
</table>

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 and 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 concentrations in 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 may be adjusted to the student’s interest and needs. Alternatives to numerical modeling in the geohydrology option could be chemical or environmental chemistry, 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 a 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, 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 entire year is agreed upon by the student and the faculty advisor. This program and any subsequent changes must also be approved by the chair of the MAE Master of Engineering committee. An individual student’s curriculum includes a 4- to 8-credit design course, a minimum of 12 credits in mechanical engineering or a closely related field, 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 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 MAE master of engineering chair.

The technical electives may be courses of appropriate level in math, physics, chemistry, or engineering; a maximum of 3 credits 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, or systems manufacturing minors.

MASTER OF ENGINEERING
(OPRERATIONS RESEARCH AND INFORMATION ENGINEERING)
Offered by the School of Operations Research and Information Engineering
Contact: 201 Rhodes Hall, 255-9128, www.orie.cornell.edu

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 at Cornell and programs in the United States and abroad 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 Semester in Strategic Operations immersion at JGSM, data mining and analytical marketing, 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 other engineering fields and in business. For information about the manufacturing and industrial engineering concentration, contact the Center for Manufacturing Enterprise, 291 Grumman Hall, 255-5545; about the Semester in Strategic Operations, 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, certain other concentrations may entail an additional summer or semester, depending on the student’s preparation.

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 (JGSM) “Accelerated MBA” (formerly Twelve-Month Option).

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.

MASTER OF ENGINEERING (SYSTEMS ENGINEERING)

Offered by The Systems Engineering Program
Contact: 206 Rhodes Hall, 254-8998, www.systemseng.cornell.edu

Today’s engineering environment is increasingly complex and rapidly changing. Due in part to emerging technologies and globalization, engineers must think in terms of complex, integrated, globally optimized solutions to devise designs that address the complexity of the real world. Success in this environment requires a comprehensive understanding of systems engineering.

The Systems Engineering Program emphasizes the fundamentals of requirements analysis, systems architecture, product development, project management, optimization, simulation, and systems analysis. The program's strength in these areas helps promote an understanding of the systems process throughout an organization and prepares students to transition from designing and managing independent engineering components and projects to creating integrated solutions that meet customer needs.

The M.Eng. (Systems Engineering) program is designed for students with a solid disciplinary background who want to specialize in Systems Engineering. It requires a minimum of 30 credit hours. Students must complete the following required courses:

- Applied Systems Engineering (5 credits)
- Systems Architecture, Behavior, and Optimization (3 credits)
- Project Management (CEE 5800) (4 credits)
- Systems Engineering Design Project (6–8 credits)

Approved electives account for the remaining credits to reach the minimum of 30 credits required for the degree and are to be chosen from the following areas:

- Systems Modeling and Analysis (at least one course)
- Courses that enrich the understanding of generic methods to design and analyze systems including courses in simulation, feedback and control, decision-making, or risk analysis.
- Systems Applications
- Courses that provide depth in the design and operation of specific systems such as power, communication, software, manufacturing, or transportation.
- Systems Management (at most one course)
- Courses that enhance student understanding of the management activities and processes which are necessary to successfully design and operate systems.

In addition to the Master of Engineering degree in Systems Engineering, the Systems Engineering Program offers a second course of study: the minor in Systems Engineering. The SE minor is designed for students who want a concentration in Systems Engineering as part of the Master of Engineering degree in another engineering discipline.

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 ENGRI
Biological and Environmental Engineering BEE
Applied and Engineering Physics AEP
Chemical and Biomolecular Engineering CHHEME
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.

**ENGRD 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.

**ENGRD 2510 Engineering for a Sustainable Society (also BEE 2510)**

Fall. 3 credits. Pre- or corequisite: MATH 2930. B. A. Ahner. Courses on 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 to reduce 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 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 customers. 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.

**ENGRD 2020 Mechanics of Solids (also TAM 2020)**

Fall, spring. 4 credits. Prerequisite: PHYS 1112. Co-registration in MATH 2930, or permission of instructor. All students must take a lab section. Staff.

Covers principles of statics, force systems, and equilibrium; frames; mechanics of deforming 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.

**ENGRD 2030 Dynamics (also TAM 2030)**

Fall, spring. 3 credits. Prerequisite: ENGRD/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 rotating 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 electronic technologies. 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 AEP 2520)**

Fall, spring, summer. 3 credits. Prerequisite: CS 1110, CS 1130, 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 interface design (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.

**ENGRD 2190 Mass and Energy Balances (also CHEM 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.

**ENGRD 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 considered 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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGRD 2610</td>
<td>Mechanical Properties of Materials: From Nanodevices to Superstructures (also MEE 2610)</td>
<td>Fall. 3 credits. Prerequisite: MATH 1910. Corequisite: PHYS 1112 or permission of instructor. 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.</td>
</tr>
<tr>
<td>ENGRD 2620</td>
<td>Electronic Materials for the Information Age (also MSE 2620)</td>
<td>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.</td>
</tr>
<tr>
<td>ENGRD 2640</td>
<td>Computer-Instrumentation Design (also AEP 2640)</td>
<td>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 control and 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.</td>
</tr>
<tr>
<td>ENGRD 2700</td>
<td>Basic Engineering Probability and Statistics</td>
<td>Fall, spring, summer. 3 credits. Prerequisite: MATH 1910 and MATH 2940. 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.</td>
</tr>
<tr>
<td>ENGRD 3200</td>
<td>Engineering Computation</td>
<td>Spring. 3 credits. Prerequisite: CS 1112 and MATH 2930. Corequisite: MATH 2940. Recommended: completion of MATH 2940. P. J. Diamentis. 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.</td>
</tr>
<tr>
<td>ENGRG 1060</td>
<td>Exploration in Engineering Seminar</td>
<td>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, operations research. Hands-on experience in weekly labs, as well as design projects to introduce concepts of the engineering design process.</td>
</tr>
<tr>
<td>ENGRG 1091</td>
<td>Cooperative Workshop for MATH 1910</td>
<td>Fall. 1 credit. Corequisite: MATH 1910. S-U grades only. Academic Excellence Workshop for MATH 1910. Weekly two-hour cooperative 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.</td>
</tr>
<tr>
<td>ENGRG 1092</td>
<td>Cooperative Workshop for MATH 1920</td>
<td>Fall, spring. 1 credit. Corequisite: MATH 1920. S-U grades only. Academic Excellence Workshop for MATH 1920. Weekly two-hour cooperative 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.</td>
</tr>
<tr>
<td>ENGRG 1093</td>
<td>Cooperative Workshop for MATH 2930</td>
<td>Fall, spring. 1 credit. Corequisite: MATH 2930. S-U grades only. Academic Excellence Workshop for MATH 2930. Weekly two-hour cooperative 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.</td>
</tr>
<tr>
<td>ENGRG 1094</td>
<td>Cooperative Workshop for MATH 2940</td>
<td>Fall, spring. 1 credit. Corequisite: MATH 2940. S-U grades only. Academic Excellence Workshop for MATH 2940. Weekly two-hour cooperative 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.</td>
</tr>
<tr>
<td>ENGRG 1095</td>
<td>Cooperative Workshop for CS 2110</td>
<td>Fall, spring. 1 credit. Corequisite: CS 2110. S-U grades only. Academic Excellence Workshop for CS 2110. Weekly two-hour cooperative 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.</td>
</tr>
<tr>
<td>ENGRG 1096</td>
<td>Cooperative Workshop for CS 1110</td>
<td>Fall, spring. 1 credit. Corequisite: CS 1110. S-U grades only. Academic Excellence Workshop for CS 1110. Weekly two-hour cooperative 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.</td>
</tr>
<tr>
<td>ENGRG 1097</td>
<td>Cooperative Workshop for CS 1112</td>
<td>Fall, spring. 1 credit. Corequisite: CS 1112. S-U grades only. Academic Excellence Workshop for CS 1112. Weekly two-hour cooperative 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.</td>
</tr>
</tbody>
</table>
ENGRG 2350  Career Development for Engineering  
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 like 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  Inviting an Information Society (also ECE/AMST 2980, HIST 2980, STSINFO 2980)  
Spring. 3 credits. Approved for humanities distribution. Explores the history of information technology from the 1890s to the present by considering the technological 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 3220  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. D. P. Loucks.

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)  
Fall. 4 credits. Approved for humanities distribution. Next offered 2008–2009. The history of engineering in the United States from 1800 to the present. Investigates the education of engineers, how engineering changed from a masculine profession to one more open to women, the building of 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 loading 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 the effects of structures subjected to extreme events. Types of structures considered include skyscrapers, bridges, aircraft, and underground structures.

ENGRG 3600  Ethical and Social Issues in Engineering (also STS 3601)  
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, 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 revisits 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, 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. E. Giannelis. 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 telecommunication to biotechnology.

ENGRG 1120  Introduction to Chemical Engineering (also CHEM 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  Water Treatment Design (also CEE 1130)  
Spring. 3 credits. M. E. Weber-Shirk. Students learn how to design: reservoirs to provide water during droughts, aqueducts to transport water, and water treatment plants to prevent waterborne diseases. The course includes field trips and a capstone project: a computer-controlled miniature water treatment plant, and exploring new technologies for making safe drinking water.

ENGRG 1160  Modern Structures (also CEE 1160)  
Fall. 3 credits. W. Aquino. 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 loading 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 the effects of 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 dynamics, 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 1180  Design Integration: DVDs and iPods (also TAM 1180)  
Spring. 3 credits. Next offered 2009–2010. W. Sachse. This course examines the broad range of systems and engineering technologies required to build today’s remarkable music/data and video sources.]
ENGRI 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 bio-compatibility. Case studies of design lead to consideration of regulatory approval requirements and legal liability issues.

ENGRI 1200 Introduction to Nanoscience and Nanotechnology (also AEP 1200)
Fall. 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 material particles when confined to nanoscale solid state; surfaces; behavior of light and nanotechnology—what they are and why. Also covers "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 material particles when confined to nanoscale solid state; surfaces; behavior of light and nanotechnology—what they are and why.

ENGRI 1220 Earthquake! (also EAS 1220)
Spring. 3 credits. L. Brown.
Explores the science of natural hazards and strategic resources. Covers techniques for locating and characterizing earthquakes, and assesses the damage they cause; methods of using sound waves to image the earth's interior to search for strategic materials; and the historical importance of such resources. Includes seismic experiments on campus to probe for groundwater, the new critical environmental resource.

ENGRI 1250 Introduction to Signals and Telecommunications
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 of 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 2090, and co-registration in or completion of PHYS 2213. L. Pollack. For description, see ENGRD 2520.
Modern biology and medicine is 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 ART 1700, CIS/CS 1750, MUSIC 1465, PSYCH 1650)
Fall. 3 credits. Complements ART 1701+ and MUSIC 1421+. S–U or letter grades. Texts: Mathematical Physics by Butkov.
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.

AEP 3610 Introductory Quantum Mechanics
Fall, through second week of Oct.; summer, first half of semester. 2 credits. Prerequisite: 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-particle systems, interaction with radiation, and identical particles.

AEP 3620 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 3610 or PHYS 3316) 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.

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 guidance in waveguides, 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 resonant and two-level atoms, atom cooling and trapping, multiphoton processes, spontaneous and stimulated 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 7990. Staff.
Introduces 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 Mermin.

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 biological 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, 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, 4220, 4500 or equivalent.
Directed at students who have had an introductory solid state physics course 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 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 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 grades only. 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. Gady.
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 registering.
Graduate-level introduction to the tools used to image and probe optical, electronic, chemical, and mechanical properties of 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. Focus is 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)
Spring. 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 is 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 NPTC 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 that are covered in the course 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 II (also ECE 6820)
Spring. 3 credits. Prerequisite: ECE 5810. C. E. Seyler.
For description, see ECE 6820.

BIOLICAL AND ENVIRONMENTAL ENGINEERING


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 1130 Introduction to Metal Fabrication Techniques
Spring. 3 credits. Limited to 20 students per lab.

BEE 1140 Introduction to Wood Construction
Fall. 3 credits. Limited to 16 students per lab.

BEE 1150 Advanced Metal Fabrication Techniques
Spring. 1–2 credits. Prerequisite: BEE 1130 permission of instructor.

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 1110, 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.
### 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 3710 Physical Hydrology for Ecosystems
Spring. 3 credits. Prerequisite: MATH 1920 or permission of instructor. Offered alternate years.

### BEE 4010 Renewable Energy Systems
Spring. 3 credits. Prerequisite: college physics.

### BEE 4270 Water Sampling and Measurement
Fall. 3 credits. Prerequisites: fluids or hydrology course and MATH 1910. Next offered 2009–2010.

### 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 4520 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

### 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 2500 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. 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. Next offered 2009–2010.

### BEE 4730 Watershed Engineering
Fall. 3 credits. Prerequisites: fluid mechanics 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 4780 Ecological Engineering
Spring. 3 credits. Prerequisite: junior-level environmental quality engineering course or equivalent. Next offered 2009–2010.

### BEE 4800 Introduction to 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 4870 Sustainable Energy Systems
Fall. 3 credits. Prerequisites: MATH 2930 and thermodynamics course.

### BEE 4890 Entrepreneurial Management for Engineers
Spring. 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, others by permission of instructor. S–U or letter grades.

### BEE 4930 Technical Writing for Engineers
Fall. 1 credit. Corequisite: BEE 4730.

### BEE 4960 Capstone Design in Biological and Environmental Engineering
Fall, spring. 1 credit. Corequisite: BEE 4730 or 4780, or 4910.

### 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 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 5900 M.P.S. Project
Fall, spring. 1–6 credits. Requirement for all M.P.S. candidates in field.

### BEE 5950 Master of Engineering Design Project
Fall, spring. 3–6 credits. Prerequisite: admission to M.Eng. degree program.

### BEE 6420 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.

### BEE 6470 Water Transport in Plants (also BIOPL 6510)
Fall. 2 credits. Offered alternate years; next offered 2009–2010.

### BEE 6490 Solute Transport in Plants (also BIOPL 6490)
Fall. 3 credits. Offered alternate years.

### BEE 6510 Bioremediation: Engineering Organisms to Clean Up the Environment
Spring. 3 credits. Prerequisite: BIOMI 2900 or BIORM 3510 or permission of instructor. Next offered 2009–2010.

### BEE 6550 Thermodynamics and Its Applications
Fall. 3 credits. Prerequisite: MATH 2930 or equivalent; for undergraduates, permission of instructor. Offered alternate years; next offered 2009–2010.
BIOMEDICAL ENGINEERING


BME 1310 Introduction to Biomedical Engineering (also ENGR 1310)
Fall. 3 credits. Prerequisite: freshman or sophomore standing. C. B. Schaffer and S. D. Archer.

For description, see ENGR 1310.

BME 3010 Molecular Principles of Biomedical Engineering (also CHEME 4010)
Fall. 3 credits. Prerequisite: basic biology such as BIOC 1110, BIOCMB 3300, or BIOM 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 BIOC 1110, BIOCMB 3300, or BIOM 2900 plus mathematics through differential equations (e.g., MATH 2210 or 2940), or permission of instructor. Lec and lab. C. Fischbach-Teschl 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; next offered 2009–2010.

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. Lipsett and S. D. Archer.

Focuses on understanding how circulating agents and bioelectric activity comprises inter- 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 2200 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: CHEMF 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. 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: BION 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 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 5500 Product Engineering and Design in Biomedical Engineering
Fall. 3 credits. Prerequisite: graduate standing; requirement for M.Eng. students majoring in BME. D. Lipson.
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 5620 Biomimeralization (also MSE 5620)
Spring. 3 credits. L. Estoff.
For description, see MSE 5620.

[BME 5650 Biomechanical Systems—Analysis and Design (also MAE 5650)]

BME 5700 Biophysical Methods (also BIONE/AEP 4700)
Fall. 5 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 Biomech (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
Spring. 3 credits. Prerequisites: 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]
Spring. 3 credits. Prerequisites: BME 3010 or 4010 (or BME 5200 as corequisite). Next offered 2010. 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 conduct (or direct the 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 nontenuse research or studies on special projects in biomedical engineering.

BME 6180 Principles of Medical Imaging (also AWD 6180)
Fall. 1–3 credits. Prerequisites: 3-credit enrollment requires functional knowledge and skills of linear algebra, calculus, Fourier transformation, and calculus-based physics. 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 practical 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 contrast 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 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 CHEM 6310)]

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 instrumentation 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 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. 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 tissue, 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)
Fall. 3 credits. Letter grades only.
M. L. Shuler and H. C. Hoch.
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 are 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 and spring. 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. Next offered 2010. 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 8999 M.S. Thesis Research**  
Fall. spring. Variable. credit. Thesis research for the M.S. degree in BME.

**BME 9999 Ph.D. Thesis Research**  
Fall, spring. Variable credit. Thesis research for the Ph.D. degree in BME.

**CHEMICAL AND BIOMOLECULAR ENGINEERING**


**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 ENGRD 2190)**  
Fall. 3 credits. Corequisite: physical chemistry course or permission of instructor. S. Daniel. For description, see ENGRD 2190.

**CHEME 2880 Biomedical Engineering: Fundamentals and Applications**

**CHEME 3010 Nonresident Lectures**  
Spring, 1 credit. P. Clancy. Lectures 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**  

**CHEME 3240 Heat and Mass Transfer**  
Fall. 3 credits. Prerequisite: CHEME 3230. A. D. Stroock. 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 3150 and 3240. Y. L. Joo. 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 3150 and 3230. A. B. Anton. 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, 3520, 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.
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, motility, 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 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 "Colloquium and Seminars in Physiological 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 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.
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. Prerequisites: 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.
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), CHEM 5250, AEP 4340 or permission of instructor. B. L. Kirby.
For description, see MAE 5240.

CHEME 6310 Engineering Principles for Drug Delivery (Also 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 3800–3900 and CHEME 3130 or equivalent. F. A. Escolledo.
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. C. Cohen and A. D. Stroock.
Topics include 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 3290–3240 or equivalent. Y. L. Joo.
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. Staff.
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. 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.
General chemical engineering seminar.

CHEME 7920 Principles and Practices of Graduate Research
Fall. 1 credit. M. P. DeLisa and A. D. Stroock.
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.
Thesis research for the M.S. degree in chemical engineering.

CHEME 9999 Thesis Research
Fall, spring. Variable credit.
Thesis research for the Ph.D. degree in chemical engineering.

CIVIL AND ENVIRONMENTAL ENGINEERING

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 Water Treatment Design (also ENGRD 1130) (s,3) CEE 1160 Modern Structures (also ENGR 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,5,3)
CEE 3200 Engineering Computation (formerly CEE/ENGRI 3200) (also ENGRG 3200) (s,3)
CEE 3230 Engineering Economics and Management (also ENGRG 3230) (s,3)
CEE 4000 Senior Honors Thesis (f,s,3,5,3)
CEE 4010 Undergraduate Engineering Teaching in CEE (f,s,3)

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 (f,3)
CEE 4410 Retaining Structures and Slopes (s,3)
CEE 4440 Environmental Site and Remediation Engineering (s,5)
CEE 5041/5042 Design Project in Geotech/ Structures (s,3)
CEE 6045 Special Topics in Geotechnical Engineering (f,s,3)
CEE 6070 Seminar—Civil Infrastructure (f,s,1)
CEE 6400 Foundation Engineering (f,5)
CEE 6410 Retaining Structures and Slopes (s,3)
CEE 6440 Environmental Site and Remediation Engineering (s,5)
CEE 7040 Research in Geotechnical Engineering (f,s,3)
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,5)
CEE 7460 Embankment Dam Engineering (s,2)
CEE 8400 Thesis—Geotechnical Engineering (f,s,3)

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,4)
CEE 4720 Introduction to the Finite Element Method (f,3)
CEE 4730 Design of Concrete Structures (f,4)
CEE 4740 Design of Steel 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,5)
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,5)
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,5)
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,5)
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 Computational Solids and Structural Mechanics (s,4)
CEE 7790 Advanced Behavior of Metal Structures (f,4)
CEE 8700 Thesis—Structural Engineering (f,s,var.)

Environment
See also CEE 1130, 3200, 3040, and 4920

Environmental Engineering
CEE 1130 Water Treatment Design (s,3)
CEE 2550 AguaClara: Sustainable Water Supply Project (f,s,3)
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,3)
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,3)
CEE 7360 Turbulences and Turbulent Mixing in Environmental Stratified Flows (s,3)
CEE 8500 Thesis—Environmental Engineering (f,s,3)

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 6020 Seminar—Water Resources and Environmental Engineering (f,1)
CEE 6030 Seminar—Hydraulics (s,1)
CEE 6035 Special Topics in Hydraulics (f,s,3)
CEE 6290 Advanced Numerical Methods for Engineers (f,3)
CEE 6300 Computational Fluid Dynamics and Environmental Flows (s,3)
CEE 6310 Computational Simulation of Flow and Transport in the Environment (s,3)
CEE 6320 Hydrology (s,3)
CEE 6350 Flow in Porous Media and Groundwater (f,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,3)
CEE 8300 Thesis—Fluid Mechanics and Hydrology (f,s,3)

Environmental Engineering Systems and Management
See also CEE 3040.

Engineering Management
CEE 4920 Engineers for a Sustainable World (f,3)
CEE 5900 Project Management (f,3)
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,3)
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,3)
CEE 6090 Creativity, Innovation, and Leadership (s,3)

Environmental and Public Systems
CEE 3230 Engineering Economics and Management (also ENGRG 3230) (f,su,3)
CEE 4650 Environment/Energy and Transportation Planning and Management (s,3)
CEE 5021/5022 Design Project in Environmental or Water Resource Systems (f,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,3)
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 Environment/Energy and Transportation Planning and Management (s,3)
CEE 6930 Public Systems Modeling (f,4)
CEE 7020 Environmental and Water Resources Systems Analysis Research (f,s,3)
CEE 8200 Thesis—Environmental and Water Resources Systems (f,s,3)

Remote Sensing
CEE 4110 Remote Sensing: Resource Inventory Methods (also CSS 4110) (s,3)
CEE 6015 Special Topics—Remote Sensing (f,s,3)
CEE 6100 Remote Sensing Fundamentals (also CSS 6100) (f,3)
CEE 6150 Digital Image Processing (s,3)
CEE 7010 Research—Remote Sensing (f,s,3)
CEE 8100 Thesis—Remote Sensing (f,s,3)

Systems Engineering
CEE 4060 Civil Infrastructure Systems (f,3)
CEE 5240 Applied Systems Engineering (also CS 5040, ECE/ORIE 5120, MAE 5910, SYSEN 5100) (f,3)
CEE 5252 Systems Architecture, Behavior, and Optimization (also CS 5050, ECE/ORIE 5130, MAE 5920, SYSEN 5200) (s,3)
CEE 5290 Heuristic Methods for Optimization (also CS/CIS 5720, ORIE 5340) (f,s,3)
CEE 6080 Seminar—Engineering Systems and Management (f,s,3)
CEE 6660 Civil Infrastructure Systems (f,3)
CEE 6790 Environmental Engineering (s,3)
Transportation

CEE 3610 Introduction to Transportation Engineering (s,su,3)
CEE 4610 Urban Transportation Planning and Modeling (s,3)
CEE 4630 Transportation and Information Technology (f,3)
CEE 4640 Transportation Systems Design (s,3)
CEE 4650 Environment/Energy and Transportation Planning and Management (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,3)
CEE 6070 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 Environment/Energy and Transportation Planning and Management (s,3)
CEE 7620 Practicum in Modeling Transportation Systems (f,3)
CEE 8600 Thesis—Transportation Engineering (f,s,3, var.)

CEE 1130 Water Treatment Design (also ENGR 1130)
Spring. 3 credits. Students must register under ENGR 1130. M. L. Weber-Shirk. 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. W. Aquino. Course in Introduction to Engineering series. For description, see ENGR 1160.

CEE 2550 AguaClara: Sustainable Water Supply Project
Fall. 3 credits. Meets with CEE 4550. M. L. Weber-Shirk. Course in Introduction to Engineering series. 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. Applications include structural reliability, windspeed/flood distributions, pollutant concentrations, and models of vehicle arrivals.

CEE 3080 Introduction to CADD
Fall, spring. 1 credit. Prerequisites: attendance at a first meeting of one section; permission of instructor given after the first week of section meetings. No pre-enrollment allowed. Priority given to engineering students. Course begins first Mon. of each semester. Staff.

CEE 3610 Introduction to Transportation Engineering
Spring; usually offered in summer for Engineering Co-op Program. 3 credits. A. H. Meyburg and J. Mbwana. 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: ENGR 2020. Corequisite: MATH 2940. Staff. 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. 3 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
Fall. 3 credits. Prerequisites: probability and statistics (CEE 3040 or equivalent), or permission of instructor. Recommended: engineering economics (CEE 3230 or equivalent) course. F. Vanek. Introduction to the framing and solution of civil infrastructure problems using a systems engineering approach. Focuses on 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 Remote Sensing: Resource Inventory Methods (also CSS 4110) Spring. 3 credits. Prerequisite: permission of instructor. Staff. 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 hydromynamics, 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 2009–2010. 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 projects. 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 Fall. 3 credits. Prerequisite: CEE 3410. P. H. Kallaway. 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 Spring. 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 2009–2010. 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. 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, bioenergy, molecular microbiology; and microbial ecology. This is an introductory course and is inappropriate for those who have taken BIOMI 2900 or equivalent.


CEE 4530 Laboratory Research in Environmental Engineering Fall. 3 credits. Prerequisite: CEE 3510 or permission of instructor. J. J. Bisogni, J. M. Gossett, and A. E. Richardson. Laboratory investigations of reactor flow characteristics; acid rain/late 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. Prerequisite or corequisite: CEE 4520, 4530, or 4540. 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 aguacalar.cee.cornell.edu.

CEE 4610 Urban Transportation Planning and Modeling Spring. 3 credits. J. R. Mbwanza. 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. Focus on decision making: networks, and investment strategies.

CEE 4650 Environment/Energy and Transportation Planning and Management 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. Next offered 2009–2010. Staff. 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. C. 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 Design of Steel 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 qualify elementary steel building and bridge behavior to enable design.

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.
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.
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. 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
Fall, spring. 3 credits each semester. Staff.

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 projects.

CEE 5051–5052 Agua Clara: Sustainable Water Supply Project
M. Weber-Shirk.
For more information, seeaguaclarapce.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.

CEE 5100–5101 Project in Civil Infrastructure Systems
Fall, spring. 3 credits each semester.

CEE 5240 Applied Systems Engineering (also CS 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 CS 5050, ECE 5130, ORIE 5142, MAE 5920, SYSEN 5200)
Spring. 3 credits. Prerequisites: 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/CIS 5720 ORIE 5530)
Fall. 3 or 4 credits.

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 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
Spring. 3 credits. Prerequisite: permission of instructor. Staff.
Intensive evaluation of the management aspects of a major engineering project or system.

CEE 5920 Engineering Management Methods
Spring. 3 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 5930 Engineering Management
Spring. 3 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.
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, nuclear hazards, threat assessment, transportation risks, industrial accidents, waste incineration, air pollution modeling, public health, regulatory policy, risk communication, and risk management.

**CEE 6015 Special Topics in 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.

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. D. P. Loucks.

Supervised study, by individuals or small groups, of one or more specialized topics not covered in regular courses.

**CEE 6030 Seminar—Hydraulics**

Spring. 1 credit. Requirement for graduate students majoring in hydraulics or hydraulic engineering. Open to undergraduates and graduates. Staff. 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. R. E. Richardson.

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 Data**

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. Staff. 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 6080 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 remote sensory interpretation of 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 3250 and 5970 or BEE 4750. 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. 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 6290 Numerical Methods for Engineers**

Fall. 3 credits. P. J. Diamessis.

The primary focus is algorithm implementation within the context of engineering applications (spanning fluid and solid/fracture mechanics and beyond). Student projects will include parallel implementation using resources at the Theory Center. Course topics will include: Sources of error and error propagation, eigenvalue/eigenvector computation, solution of linear systems via direct or iterative methods and issues of parallel implementation, least squares approximation of lab/simulation data, solution of non-linear equations, interpolation in one and two dimensions, fast Fourier transforms (serial vs. parallel) and wavelets.

**CEE 6300 Computational Fluid Dynamics for Environmental Flows**

Spring. 3 credits. Course offered on demand. Please contact professor if interested in this course. P. J. Diamessis.

Higher-order spatial discretization schemes (spectral and compact-finite difference). One-dimensional nonlinear convection, diffusion, and Burger’s equations (Burgers eqn., Korteweg-DeVries eqn. and Shallow Water eqns.) and
implications for environmental fluid flow simulations. Two-dimensional problems and fast iterative solvers. Numerical solution of the incompressible Navier-Stokes equations in an environmental/geophysical context. Advanced topics may include: Introduction to turbulence subgrid scale modeling in stratified/rotating flow, free surface flow modeling and representation of complex topography.

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 3510. 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.


[C EE 6340 Boundary Layer Meteorology] Fall. 3 credits. Prerequisite: CEE 3510 or permission of instructor. Next offered 2008–2009. Please contact professor if interested in this course. W. H. Brutsaert. Physical processes in the lower atmospheric environment: turbulent transport in the atmosphere; 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.

[C EE 6350 Small and Finite Amplitude Water Waves] Spring. 3 credits. Taught based on demand; please contact professor if interested in this course. W. 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. Taught based on demand; please contact professor if interested in this course. E. A. Cowen. Covers analytic and dimensional 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 6272)
Spring. 4 credits. Pre- or corequisites: CEE 3510 or equivalent and CEE 3040 or equivalent. E. A. Cowen. Introduction to experimental data collection and analysis, in particular as they pertain to fluid flow. Covers control of experimental testing, analog and digital data acquisition systems, separate sampling theory, digital signal processing, and uncertainty analysis. Also covers experimental devices, acoustic and laser Doppler velocimetry, full-field (2-D) quantitative imaging techniques. Includes laboratory experiments and a project.

CEE 6400 Foundation Engineering
Fall. 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
Spring. 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 excavations 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 2009–2010. T. D. O’Rourke. Covers principles of hydrogeology, contaminant migration, and remediation technologies relating 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. J. Bisogni. 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. 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

CEE 6560 Physical/Chemical Process Remediation Engineering
Fall. 3 credits. Prerequisite: CEE 6530 or permission of instructor. J. M. Gossett. 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 processes.

CEE 6580 Biodegradation and Biocatalysis
Spring. 3 credits. Prerequisites: CEE 4510 or BIOMI 2900 or equivalent; CEE 3510 or CHEM 3500 or permission of instructor. 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 biocconversion 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.
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, concrete mixtures, 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/MAE 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 2009–2010.
M. D. Grigoriu.

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
Fall. 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. F. Vanek. 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 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 is in 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. Staff.
The student may select an area of investigation in 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 a second course in fluid mechanics or with instructor's permission. Course offered on demand. Please contact professor if interested in the course. P. J. Diemans.
Fundamentals of stably stratified flows, stratified homogeneous turbulence (spectra, lengthscales, 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.

**CEE 7410 Rock Engineering**
Fall. 3 credits. Prerequisite: CEE 3410 or permission of instructor. Recommended: Introductory geology. T. D. O'Rourke.
Geological and mineralogical 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**
Spring. 2 credits. Prerequisite: CEE 6400.
Continuation of CEE 6400, with detailed emphasis on special topics in soil-structure interaction. Typical topics include lateral and pullout loading of deep foundations, pile group behavior, foundations for offshore structures, foundations for special structures.

**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 2009–2010. F. H. Kulhawy.

**CEE 7620 Practicum in Modeling Transportation Systems**
Fall. 3 credits. Prerequisites: CEE 6610, 6620, and 6630. L. K. Noizick.
Continuation of CEE 6400, with detailed analysis; design of foundations on, and including metals, concrete, 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 2009–2010. M. D. Grigoriu.
Review of probability theory, stochastic processes, and its 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 differential 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 and random media.

**CEE 7720 Random Vibration**
Fall. 3 credits. Prerequisites: MAE 3260 and ENGRD 2700, or equivalent, and permission of instructor. Next offered 2008–2009. 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 2009–2010. M. D. Grigoriu.
Review of probability theory, practical measures for structural reliability, second-moment reliability, 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. Next offered 2009–2010. Staff.
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, tension, limit analysis, and gives an introduction to finite element modeling of reinforced concrete structures.

**CEE 7750 Nonlinear Finite Element Analysis**
Spring. 3 credits. 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 2009–2010. C. Earls.

**CEE 7770 Computational Solid and Structural Mechanics**
Spring. 3 credits. Staff.
This course covers the formulation and numerical solution of problems of solids and structures using the finite element method. Topics include a review of solid mechanics: nonlinear kinematics, invariance, first and second law of thermodynamics, and constitutive equations with internal variables; strong forms and weak forms; implicit and explicit algorithms; variants of Newton's method; and Lagrangian and Eulerian formulations. Application topics are chosen from the following areas: 3D finite elasticity, fully nonlinear beams and shells, distributed and discrete damage, contact-impact, and plasticity.

**CEE 7790 Advanced Behavior of Metal Structures**
Fall. 4 credits. Prerequisite: CEE 3410 or permission of instructor. C. Earls.
An advanced course focused on the use of solid and structural mechanics to quantify more complex aspects of metal structure behavior so as to enable more sophisticated approach to design.

**CEE 8100 Thesis—Remote Sensing**
Fall, spring. 1–12 credits. Students must register for credit with professor at start of each semester. W. D. Philipot.
The student selects a thesis research topic 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.
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.
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**


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, 1119, or equivalent. Assumes student is comfortable with mathematics (at the level of one semester of calculus) but has no prior programming experience.

**CS 1113 Computing Using Java—Honors**

Fall or spring. 4 credits.

**CS 1114 Introduction to Computing Using MATLAB and Robotics**

Spring. 4 credits. Prerequisite: some programming experience. Next offered 2009–2010.

**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, summer. 1 credit. Prerequisite: one course in programming. S–U grades only.

**CS 1301 Introduction to Programming Applications**

Fall, weeks 1–7. 2 credits. Students must enroll in both CS 1301 and 1302. For description, see INFO 1301 in CIS section.

**CS 1302 Introduction to Designing Web Applications**

Fall, weeks 8–14. 2 credits. Students must enroll in both CS 1301 and 1302. Prerequisite: CS 1301 or equivalent knowledge. For description, see INFO 1302 in CIS section.

**CS 1610 Computing in the Arts**

Fall, 3 credits. Recommended: good comfort level with computers and some of the arts.

**CS 1620 Visual Imaging in the Electronic Age**

Fall. 3 credits. For description, see ART 1700.

**CS 1710 Introduction to Cognitive Science**

Fall, summer. 3 credits. 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 2022 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**

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 2111 Programming Practicum**

Fall, spring. 1 credit. Prerequisite: one course in programming or permission of instructor.

**CS 2300 Intermediate Design and Programming for the Web**

Spring. 3 credits. Prerequisite: CS 1301 and 1302 strongly recommended. For description, see INFO 2300 in CIS section.

**CS 2300 Discrete Structures**

Fall, spring. 3 credits. Prerequisite: one course in programming or permission of instructor.

**CS 2550 Networks**

Spring. 4 credits. Prerequisite: none. For description, see CS 2500.

**CS 3110 Data Structures and Functional Programming**

Fall, spring. 4 credits. Prerequisite: CS 2110 and 2111 or equivalent programming experience. Prerequisite: CS 2800. Should not be taken concurrently with CS 3410 or 3420.

**CS 3220 Introduction to Scientific Computation**

Spring, summer. 3 credits. Prerequisite: one programming course and MATH 2210 or 2940; knowledge of discrete probability and random variables at level of CS 2800.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 3300</td>
<td>Data-Driven Web Applications (also INFO 3300)</td>
<td>Spring. 3 credits. Prerequisite: CS/ENGRD 2110. CS majors may use only one of the following toward their degree: CS/INFO 3500 or CS 4321. For description, see INFO 3500 in CIS section.</td>
</tr>
<tr>
<td>CS 3410</td>
<td>Systems Programming</td>
<td>Fall. 4 credits. Prerequisites: CS 2110 or equivalent programming experience. Should not be taken concurrently with CS 3110. For description, see ECE 3140.</td>
</tr>
<tr>
<td>CS 3420</td>
<td>Computer Organization (also ECE 3140)</td>
<td>Spring. 4 credits. Prerequisite: CS 2110 or ENGRD 2390. Should not be taken concurrently with CS 3110. For description, see ECE 3140.</td>
</tr>
<tr>
<td>CS 3700</td>
<td>Explorations in Artificial Intelligence (also INFO 3702)</td>
<td>Spring. 3 credits. Prerequisites: MATH 1110 or ENGRD 2110 or permission of instructor. Next offered 2009–2010. For description, see INFO 3720 in CIS section.</td>
</tr>
<tr>
<td>CS 3740</td>
<td>Computational Linguistics (also COGST 4240, LING 4424)</td>
<td>Fall. 4 credits. Recommended: CS 2006. For description, see LING 4424.</td>
</tr>
<tr>
<td>CS 3810</td>
<td>Introduction to Theory of Computing</td>
<td>Fall or summer. 3 credits. Prerequisite: CS 2800 or permission of instructor.</td>
</tr>
<tr>
<td>CS 4110</td>
<td>Programming Languages and Logics</td>
<td>Fall or spring. 4 credits. Prerequisite: CS 3110 or permission of instructor. Next offered 2009–2010.</td>
</tr>
<tr>
<td>CS 4120</td>
<td>Introduction to Compilers</td>
<td>Spring. 2 credits. Corequisite: CS 4120.</td>
</tr>
<tr>
<td>CS 4121</td>
<td>Practicum in Compilers</td>
<td>Spring. 2 credits. Corequisite: CS 4121.</td>
</tr>
<tr>
<td>CS 4210</td>
<td>Numerical Analysis and Differential Equations (also MATH 4250)</td>
<td>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.</td>
</tr>
<tr>
<td>CS 4220</td>
<td>Numerical Analysis: Linear and Nonlinear Equations (also MATH 4260)</td>
<td>Spring. 4 credits. Prerequisites: MATH 2210 or 2940 or equivalent, one additional mathematics course numbered 3000 or above, and knowledge of programming.</td>
</tr>
<tr>
<td>CS 4300</td>
<td>Information Retrieval (also INFO 4300)</td>
<td>Fall. 3 credits. Prerequisite: CS 2110 or equivalent. For description, see INFO 4500 in CIS section.</td>
</tr>
<tr>
<td>CS 4302</td>
<td>Web Information Systems (also INFO 4302)</td>
<td>Spring. 3 credits. Prerequisites: CS 2110 and some familiarity with web site technology. For description, see INFO 4502 in CIS section.</td>
</tr>
<tr>
<td>CS 4320</td>
<td>Introduction to Database Systems</td>
<td>Fall. 3 credits. Prerequisites: CS 3110 (or CS 2110, 2111 and permission of instructor).</td>
</tr>
<tr>
<td>CS 4321</td>
<td>Practicum in Database Systems</td>
<td>Fall. 2 credits. Pre- or corequisite: CS 4520. CS majors may use only one of the following toward their degree: CS/INFO 3500 or CS 4321.</td>
</tr>
<tr>
<td>CS 4410</td>
<td>Operating Systems</td>
<td>Spring. 3 credits. Prerequisite: CS 3410 or 3420.</td>
</tr>
<tr>
<td>CS 4411</td>
<td>Practicum in Operating Systems</td>
<td>Spring. 2 credits. Corequisite: CS 4410.</td>
</tr>
<tr>
<td>CS 4420</td>
<td>Computer Architecture (also ECE 4750)</td>
<td>Fall. 4 credits. Prerequisites: ENGRD 2300 and CS 3420/ECE 3140. For description, see ECE 4750.</td>
</tr>
<tr>
<td>CS 4450</td>
<td>Computer Networks</td>
<td>Spring. 4 credits. Prerequisite: CS/ENGRD 2110 and CS 2800 or equivalent.</td>
</tr>
<tr>
<td>CS 4520</td>
<td>Introduction to Bioinformatics</td>
<td>Spring. 4 credits. Prerequisites: CS/ENGRD 2110 and CS 2900.</td>
</tr>
<tr>
<td>CS 4620</td>
<td>Introduction to Computer Graphics (also ARCH 3704)</td>
<td>Fall. 3 credits. Prerequisite: CS/ENGRD 2110.</td>
</tr>
<tr>
<td>CS 4621</td>
<td>Computer Graphics Practicum</td>
<td>Fall. 2 credits. Pre- or corequisite: CS 4620.</td>
</tr>
<tr>
<td>CS 4700</td>
<td>Foundations of Artificial Intelligence</td>
<td>Fall. 3 credits. Prerequisites: CS/ENGRD 2110 and CS 2800 or equivalent.</td>
</tr>
<tr>
<td>CS 4701</td>
<td>Practicum in Artificial Intelligence</td>
<td>Fall. 2 credits. Pre- or corequisite: CS 4700.</td>
</tr>
<tr>
<td>CS 4702</td>
<td>Artificial Intelligence: Uncertainty and Multi-Agent Systems</td>
<td>Spring. 4 credits. Prerequisites: CS/ENGRD 2110 and CS 2800 or equivalent.</td>
</tr>
<tr>
<td>CS 4740</td>
<td>Introduction to Natural Language Processing (also COGST 4740, LING 4474)</td>
<td>Spring. 4 credits. Prerequisite: CS 2110.</td>
</tr>
<tr>
<td>CS 4780</td>
<td>Machine Learning</td>
<td>Spring. 4 credits. Prerequisites: CS 2111, CS 2800, or basic probability theory, and basic knowledge of linear algebra. Next offered 2009–2010.</td>
</tr>
<tr>
<td>CS 4782</td>
<td>Probabilistic Graphical Models (also BTRY 4790)</td>
<td>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). For description, see BTRY 4790.</td>
</tr>
<tr>
<td>CS 4812</td>
<td>Quantum Computation (also PHYS 4481/7681)</td>
<td>Spring. 2 credits. Prerequisite: familiarity with theory of vector spaces over complex numbers. Next offered 2009–2010. For description, see PHYS 4481.</td>
</tr>
<tr>
<td>CS 4820</td>
<td>Introduction to Analysis of Algorithms</td>
<td>Spring, summer. 4 credits. Prerequisites: CS 2800 and 3110.</td>
</tr>
<tr>
<td>CS 4830</td>
<td>Introduction to Cryptography</td>
<td>Fall. 4 credits. Prerequisites: CS 2800 (or equivalent), CS 3810 (or mathematical maturity), or permission of instructor.</td>
</tr>
<tr>
<td>CS 4850</td>
<td>Mathematical Foundations for the Information Age</td>
<td>Spring. 4 credits. Prerequisite: CS 3810.</td>
</tr>
<tr>
<td>CS 4860</td>
<td>Applied Logic (also MATH 4860)</td>
<td>Spring. 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.</td>
</tr>
<tr>
<td>CS 4999</td>
<td>Independent Reading and Research</td>
<td>Fall, spring. 1–4 credits.</td>
</tr>
<tr>
<td>CS 5150</td>
<td>Software Engineering</td>
<td>Spring. 4 credits. Prerequisite: CS 2110 or equivalent experience programming in Java or C++.</td>
</tr>
<tr>
<td>CS 5300</td>
<td>The Architecture of Large-Scale Information Systems (also INFO 5300)</td>
<td>Spring. 4 credits. Prerequisite: CS/INFO 3500 or CS 4320. For description, see INFO 5300 in CIS section.</td>
</tr>
<tr>
<td>CS 5410</td>
<td>Intermediate Computer Systems</td>
<td>Fall or spring. 4 credits. Prerequisite: CS 4410 or permission of instructor. Next offered fall 2008.</td>
</tr>
<tr>
<td>CS 5420</td>
<td>Parallel Computer Architecture (also ECE 5720)</td>
<td>Fall. 4 credits. Prerequisite: ECE 4750. For description, see ECE 5720.</td>
</tr>
<tr>
<td>CS 5430</td>
<td>System Security</td>
<td>Fall or spring. 4 credits. Prerequisites: CS 4410 or 4450 and familiarity with Java, C, or C* programming languages. Next offered spring 2009.</td>
</tr>
<tr>
<td>CS 5450</td>
<td>Advanced Computer Networks</td>
<td>Fall or spring. 4 credits. Prerequisites: CS 4450 or permission of instructor.</td>
</tr>
<tr>
<td>CS 5640</td>
<td>Computer Animation (also ART 2703, CIS 5640)</td>
<td>Fall. 4 credits. Prerequisite: none. For description, see ART 2703. Next offered spring 2009.</td>
</tr>
<tr>
<td>CS 5642</td>
<td>Advanced Animation (also ART 3702, CIS 5642)</td>
<td>Spring. 4 credits. Prerequisite: none. For description, see ART 3702. Next offered spring 2009.</td>
</tr>
<tr>
<td>CS 5643</td>
<td>Physically Based Animation for Computer Graphics</td>
<td>Spring. 4 credits. Prerequisites: CS/ENGRD 3220 and/or CS 4620 or permission of instructor. Offered alternate years.</td>
</tr>
<tr>
<td>CS 5722</td>
<td>Heuristic Methods for Optimization (also CEE 5090, ORIE 5340)</td>
<td>Fall. 3 or 4 credits. Prerequisites: CS 4450 or permission of instructor.</td>
</tr>
<tr>
<td>CS 5723</td>
<td>Heuristic Methods for Optimization (also CEE 5090, ORIE 5340)</td>
<td>Spring. 3 credits. Prerequisite: CS/ENGRD 3220 and/or CS 4620 or permission of instructor. Offered alternate years.</td>
</tr>
</tbody>
</table>
[CS 5780] Empirical Methods in Machine Learning and Data Mining
Fall or spring. 4 credits. Prerequisites: CS 2800 and 3110 or equivalent. Next offered 2009–2010.

[CS 5846] Decision Theory I (also ECON 4760/6760)
Fall. 4 credits. Prerequisite: mathematical sophistication. For description, see ECON 4760.

[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; next offered 2009–2010.

[CS 6220] Sparse Matrix Computation
Fall. 4 credits. Prerequisite: CS 6210. 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 6250] Database Systems
Spring. 4 credits. Prerequisite: CS 4320 or permission of instructor.

[CS 6262] 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 2008.

[CS 6450] Research in Computer Networks
Fall or spring. 4 credits. Prerequisite: CS 4450 or permission of instructor. Next offered fall 2008.

[CS 6460] Peer-to-Peer Systems

[CS 6522] Biological Sequence Analysis
Fall. 4 credits. Prerequisite: none.

[CS 6620] Advanced Interactive Graphics
Fall or spring. 4 credits. Prerequisite: CS 4620 and 4621 or 5620 or permission of instructor.

[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.

[CS 6670] Machine Vision
Fall or spring. 4 credits. Prerequisites: undergraduate-level understanding of algorithms and MATH 2210 or equivalent. Next offered 2009–2010.

[CS 6700] Advanced Artificial Intelligence
Spring. 4 credits. Prerequisites: CS 4700 or permission of instructor. Next offered 2009–2010.

[CS 6740] Advanced Language Technologies (also INFO 6300)
Fall or spring. 3 credits. Prerequisite: permission of instructor. Neither CS 4300 nor CS 4740 are prerequisites. Next offered fall 2008.

[CS 6746] Reasoning about Knowledge
Fall. 4 credits. Prerequisites: mathematical maturity and acquaintance with propositional logic. Next offered 2010–2011.

[CS 6766] Reasoning about Uncertainty
Fall. 4 credits. Prerequisites: mathematical maturity and acquaintance with propositional logic. Next offered 2009–2010.

[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 2009–2010.

[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 4600 or equivalent). For description, see BTRY 6790.

[CS 6810] Theory of Computing
Spring. 4 credits. Prerequisite: CS 3810 and CS 4820 or 6820 or permission of instructor.

[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 spring 2009.

[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 2009–2010.

[CS 6850] The Structure of Information Networks (also INFO 6850)
Fall or spring. 4 credits. Prerequisite: CS 4820.

[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. 4 credits. 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 7220] 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 7410] Topics in Systems
Fall or spring. 3 credits. Prerequisite: 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)
Fall. 4 credits. Prerequisite: programming experience or permission of instructor.

[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.

Fall, spring. 4 credits. Prerequisite: permission of instructor. S–U grades only.

[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**


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.

EAS 1108 Earth in the News
Summer. 3 credits. S. L. Losh.

EAS 1109 Dinosaurs
Fall. 1 credit. J. L. Cisne.

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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS 1310</td>
<td>Basic Principles of Meteorology</td>
<td>Fall. 3 credits. 1-credit lab is EAS 1330. M. W. Wysocki.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 1330</td>
<td>Basic Meteorology Lab</td>
<td>Fall. 1 credit. Corequisite: EAS 1310. M. W. Wysocki. Covers topics presented in EAS 1310.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>EAS 1340</td>
<td>Special Topics in Atmospheric Science: Weather Analysis and Forecasting</td>
<td>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 1350 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.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>EAS 1540</td>
<td>Introductory Oceanography (also BIOE 1540)</td>
<td>Fall, summer. 3 credits.LEC. Optional 1-credit lab is EAS/BIOE 1550. Fall: C. Greene and B. Monger; summer: B. Monger.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 1550</td>
<td>Introductory Oceanography Lab (also BIOE 1550)</td>
<td>Fall. 1 credit. Lab. Corequisite: EAS/BIOE 1540. C. Greene and B. Monger. Laboratory course covering topics presented in EAS/BIOE 1540.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>EAS 1700</td>
<td>Evolution of the Earth and Life (also BIOG 1700)</td>
<td>Spring. 3 credits. J. L. Cisne.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 2130</td>
<td>Marine and Coastal Geology</td>
<td>Summer. 4 credits. Prerequisite: introductory geology or ecology or permission of instructor. Staff.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EAS 2200</td>
<td>The Earth System</td>
<td>Fall. 4 credits. Prerequisites: MATH 1110/110. Letter grades only. W. M. White and A. Moore.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EAS 2220</td>
<td>Seminar—Hawai‘i’s Environment</td>
<td>Fall. 1 credit. S-U grades only. A. Moore.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>EAS 2500</td>
<td>Meteorological Observations and Instruments</td>
<td>Fall. 4 credits. Prerequisite: EAS 1310. M. W. Wysocki.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EAS 2680</td>
<td>Climate and Global Warming</td>
<td>Spring. 3 credits. Prerequisite: basic college math: S-U or letter grades. A. T. DeGaetano.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 2900</td>
<td>Computer Programming and Meteorology Software</td>
<td>Spring. 3 credits. Prerequisites: EAS 1310; MATH 1110 or equivalent. N. Mahowald and B. Belcher.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 2960</td>
<td>Forecast Competition</td>
<td>Fall and spring. 1 credit; students enroll for two consecutive semesters; credit awarded for second semester; may be repeated for credit. Prerequisite: sophomore standing in atmospheric science or permission of instructor. S-U grades only. D. S. Wilks.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>EAS 3010</td>
<td>Evolution of the Earth System</td>
<td>Fall. 4 credits. Prerequisites: EAS 2200, MATH 1120 or 1920, and CHEM 2070 or equivalent. T. Jordan, S. Riha, and W. D. Allmon. Two Saturday field trips.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EAS 3030</td>
<td>Introduction to Biogeochemistry (also NTRES 3030)</td>
<td>Fall. 4 credits. Prerequisites: CHEM 2070 or equivalent, MATH 1120, plus a biology and/or geology course. L. A. Derry and J. Yavitt.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EAS 3040</td>
<td>Interior of the Earth</td>
<td>Spring. 3 credits. Prerequisite: EAS 2200 or permission of instructor. C. Andronicos.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 3220</td>
<td>Biogeochemistry of the Hawaiian Islands</td>
<td>Spring. 4 credits. Prerequisite: two semesters of calculus and one semester of physics. K. H. Cook.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EAS 3400</td>
<td>Field Study of the Earth System</td>
<td>Spring. 6 credits. Prerequisites: enrollment in EES semester in Hawaii, EAS 2200, EAS 3030, or permission of instructor. L. A. Derry.</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>EAS 3410</td>
<td>Atmospheric Thermodynamics and Hydrostatics</td>
<td>Spring. 3 credits. Prerequisite: physics course. Next offered 2009–2010. D. S. Wilks.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 3420</td>
<td>Atmospheric Dynamics (also ASTRO 3342)</td>
<td>Spring. 3 credits. Prerequisites: MATH 2930, 2130 or equivalent; one year physics. K. H. Cook.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 3500</td>
<td>Dynamics of Marine Ecosystems (also BIOEE 3500)</td>
<td>Fall. 3 credits. Prerequisites: one year of calculus and a semester of oceanography (e.g., EAS 1540), or permission of instructor. Offered alternate years; next offered 2009–2010. C. H. Greene and R. W. Howarth.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 3510</td>
<td>Marine Ecosystems Field Course (BIOEE 3510)</td>
<td>Spring. 4 credits. Recommended. EAS 3400. C. H. Greene and C. D. Harwell.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EAS 3520</td>
<td>Synoptic Meteorology I</td>
<td>Spring. 3 credits. Prerequisite: EAS 3410. Corequisite: EAS 3420. M. W. Wysocki.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 3530</td>
<td>Physical Oceanography</td>
<td>Fall. 3 credits. Prerequisites: MATH 1120 or 1920, or one year of physics, or permission of instructor. Offered alternate years. B. C. Monger.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 4010</td>
<td>Fundamentals of Energy and Mineral Resources</td>
<td>Fall. 3 credits. Previous course in geology helpful but not necessary. L. Cathles.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 4040</td>
<td>Geodynamics</td>
<td>Spring. 3 credits. Prerequisite: calculus and calculus-based physics course or permission of instructor. Offered alternate years. J. Phipps Morgan.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 4050</td>
<td>Active Tectonics</td>
<td>Spring. 3 credits. Recommended: mechanical background equivalent to EAS 4260/4880. S-U or letter grades. Offered alternate years; next offered 2009–2010. R. Lohman.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 4170</td>
<td>Field Mapping in Argentina</td>
<td>Summer. 3 credits. Prerequisites: introductory EAS course and EAS 4260 or EAS 3040. Offered alternate years. S. Mahlburg Kay.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 4250</td>
<td>European Discovery of Impacts and Explosive Volcanism</td>
<td>Spring. 4 credits. Prerequisite: one semester of calculus plus an introductory geology course or permission of instructor. One weekend field trip. Offered alternate years. C. Andronicos.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EAS 4340</td>
<td>Exploration Geophysics</td>
<td>Fall. 3 credits. Prerequisites: MATH 1920 and PHYS 2208, 2213, or equivalent. Offered alternate years. L. D. Brown.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 4350</td>
<td>Statistical Methods in Meteorology and Climatology</td>
<td>Fall. 3 credits. Prerequisites: one introductory course each in statistics (e.g., AEM 2100) and calculus. D. S. Wilks.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 4370</td>
<td>Geophysical Field Methods (also ARKEO 4370)</td>
<td>Fall. 3 credits. Prerequisite: PHYS 2208 or 2213 or permission of instructor. Offered alternate years; next offered 2009–2010. J. Phipps Morgan.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 4400</td>
<td>Seminar: Climate Science, Impacts and Mitigation</td>
<td>Fall. 2 credits. Prerequisites: junior or higher standing. Offered alternate years; next offered 2009–2010. N. Mahowald.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>EAS 4470</td>
<td>Physical Meteorology</td>
<td>Fall. 3 credits. Prerequisites: one year each of calculus and physics. Offered alternate years; next offered 2009–2010. A. T. DeGaetano.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 4510</td>
<td>Synoptic Meteorology II</td>
<td>Fall. 3 credits. Prerequisites: EAS 3410 and 3420. S. J. Colucci.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EAS 4530</td>
<td>Mineralogy</td>
<td>Fall. 4 credits. Prerequisites: EAS 1101 or 2200 and CHEM 2070 or 2090 or permission of instructor. S. Mahlburg Kay.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EAS 4540</td>
<td>Petrology and Geochemistry</td>
<td>Spring. 4 credits. Prerequisite: EAS 4530. Next offered 2010–2011. R. W. Kay.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
<td>Prerequisites and Notes</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------------------------------------------------------</td>
<td>---------</td>
<td>----------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>EAS 4550</td>
<td>Geochemistry</td>
<td>4</td>
<td>Fall. 4 credits. Prerequisites: CHEM 2070 or CHEM 2090 and MATH 1920 or equivalent. Recommended: EAS 3040. Offered alternate years; next offered 2009–2010. W. M. White.</td>
<td></td>
</tr>
<tr>
<td>EAS 4560</td>
<td>Mesoscale Meteorology</td>
<td>3</td>
<td>Spring. 3 credits. Prerequisites: EAS 3410 and 3420 or permission of instructor. Next offered 2009–2010. S. J. Colucci.</td>
<td></td>
</tr>
<tr>
<td>EAS 4570</td>
<td>Atmospheric Air Pollution</td>
<td>3</td>
<td>Fall. 3 credits. Prerequisites: EAS 4110 or one course in thermodynamics, and one semester of chemistry, or permission of instructor. Offered alternate years. M. W. Wysocki.</td>
<td></td>
</tr>
<tr>
<td>EAS 4580</td>
<td>Volcanology</td>
<td>3</td>
<td>Fall. 3 credits. Prerequisite: EAS 3040 or equivalent. Offered alternate years. R. W. Kay.</td>
<td></td>
</tr>
<tr>
<td>EAS 4600</td>
<td>Late Quaternary Paleoecology</td>
<td>4</td>
<td>Fall. 4 credits. Offered alternate years. M. Goman.</td>
<td></td>
</tr>
<tr>
<td>EAS 4610</td>
<td>Paleoclimate: Since the Last Ice Age</td>
<td>3</td>
<td>Fall. 3 credits. Prerequisite: EAS 2200 or permission of instructor. Offered alternate years; next offered 2009–2010. M. Goman.</td>
<td></td>
</tr>
<tr>
<td>EAS 4620</td>
<td>Marine Ecology (also BIOEE 4620)</td>
<td>3</td>
<td>Fall. 3 credits. Limited to 75 students. Prerequisite: BIOEE 2610. Offered alternate years. C. D. Harvell and C. H. Greene. For description, see BIOEE 4620.</td>
<td></td>
</tr>
<tr>
<td>EAS 4700</td>
<td>Weather Forecasting and Analysis</td>
<td>3</td>
<td>Spring. 3 credits. Prerequisites: EAS 3520 and 4510. M. W. Wysocki.</td>
<td></td>
</tr>
<tr>
<td>EAS 4710</td>
<td>Introduction to Groundwater Hydrology (also BEE 4710)</td>
<td>3</td>
<td>Spring. 3 credits. Prerequisites: MATH 2940 and ENGRD 2020. Offered alternate years; next offered 2009–2010. L. M. Cathles and T. S. Steenhuis.</td>
<td></td>
</tr>
<tr>
<td>EAS 4750</td>
<td>Special Topics in Oceanography</td>
<td>3</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>EAS 4760</td>
<td>Sedimentary Basins</td>
<td>3</td>
<td>Spring. 3 credits. Prerequisite: EAS 3010 or permission of instructor. Offered alternate years; next offered 2009–2010. T. E. Jordan.</td>
<td></td>
</tr>
<tr>
<td>EAS 4780</td>
<td>Advanced Stratigraphy</td>
<td>3</td>
<td>Fall. 3 credits. Prerequisite: EAS 3010 or permission of instructor. Offered alternate years. T. E. Jordan.</td>
<td></td>
</tr>
<tr>
<td>EAS 4790</td>
<td>Paleobiology (also BIOEE 4790)</td>
<td>3</td>
<td>Spring. 4 credits. Prerequisites: one year introductory biology and either BIOEE 2740 or 3750 or EAS 3010, or permission of instructor. W. D. Allmon.</td>
<td></td>
</tr>
<tr>
<td>EAS 4810</td>
<td>Survey of Earth Systems</td>
<td>2</td>
<td>Fall, spring. 2 credits. Fall. R. Kay; spring. J. Cisne.</td>
<td></td>
</tr>
<tr>
<td>EAS 4820</td>
<td>Atmospheric Modeling</td>
<td>3</td>
<td>Spring. 3 credits. Prerequisite: differential equations, introductory computer background, junior standing or above or permission of instructor. S–U or letter grades. N. Mahowald.</td>
<td></td>
</tr>
<tr>
<td>EAS 4830</td>
<td>Environmental Biophysics (also CSS 4830)</td>
<td>3</td>
<td>Fall. 4 credits. Prerequisite: CSS 2600 or equivalent calculus. H. Van Es and S. J. Raha.</td>
<td></td>
</tr>
<tr>
<td>EAS 4840</td>
<td>Inverse Methods in the Natural Sciences</td>
<td>3</td>
<td>Fall. 3 credits. Prerequisite: MATH 2940. D. L. Hysell.</td>
<td></td>
</tr>
<tr>
<td>EAS 4870</td>
<td>Introduction to Radar and Remote Sensing (also ECE 4870)</td>
<td>3</td>
<td>Spring. 3 credits. Prerequisites: PHYS 2208 or 2213 or equivalent, or permission of instructor. D. L. Hysell.</td>
<td></td>
</tr>
<tr>
<td>EAS 4880</td>
<td>Global Geophysics</td>
<td>3</td>
<td>Spring. 3 credits. Prerequisites: MATH 1920 (or 1120) and PHYS 2080 or 2130. Offered alternate years; next offered 2009–2010. M. Pritchard and R. Lohman.</td>
<td></td>
</tr>
<tr>
<td>EAS 4910–4920</td>
<td>Undergraduate Research</td>
<td>1–4</td>
<td>Fall, spring. 1–4 credits. Students must complete form at 2124 Snee Hall. Staff. (J. L. Cisne, coordinator).</td>
<td></td>
</tr>
<tr>
<td>EAS 4940</td>
<td>Special Topics in Atmospheric Science (undergraduate level)</td>
<td>3</td>
<td>Fall or spring. 3 credits max. S–U or letter grades. Staff.</td>
<td></td>
</tr>
<tr>
<td>EAS 4960</td>
<td>Internship Experience</td>
<td>1–6</td>
<td>Fall, spring. 2 credits. Prerequisite: Enrollment in EES semester in Hawaii and EAS 3400. S–U grades only. A. Moore.</td>
<td></td>
</tr>
<tr>
<td>EAS 4970</td>
<td>Individual Study in Atmospheric Science</td>
<td>3</td>
<td>Fall or spring. 1–6 credits. Students must register using independent study form. S–U grades only. Staff.</td>
<td></td>
</tr>
<tr>
<td>EAS 4980</td>
<td>Teaching Experience in Earth and Atmospheric Sciences</td>
<td>3</td>
<td>Fall or spring. 1–4 credits. Students must register using independent study form. S–U grades only. Staff.</td>
<td></td>
</tr>
<tr>
<td>EAS 4990</td>
<td>Undergraduate Research in Atmospheric Science</td>
<td>3</td>
<td>Fall, spring. Credit TBA. Students must register using independent study form. S–U grades only. Staff.</td>
<td></td>
</tr>
<tr>
<td>EAS 5000</td>
<td>Design Project in Geohydrology</td>
<td>3</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>EAS 5020</td>
<td>Case Histories in Groundwater Analysis</td>
<td>3</td>
<td>Spring. 4 credits. L. M. Cathles.</td>
<td></td>
</tr>
<tr>
<td>EAS 5050</td>
<td>Fluid Dynamics in the Earth Sciences</td>
<td>3</td>
<td>Spring. 3 credits. Prerequisites: MATH through 2940, PHYS through 2208 or 2214, or permission of instructor. L. Cathles and M. Wysocki.</td>
<td></td>
</tr>
<tr>
<td>EAS 5110</td>
<td>Measurement and Discovery</td>
<td>1–2</td>
<td>Fall. 1 credit (S–U) or 2 credits (with paper, letter grades). Prerequisite: permission of instructor. J. L. Cisne.</td>
<td></td>
</tr>
<tr>
<td>EAS 5220</td>
<td>Advanced Structural Geology II</td>
<td>3</td>
<td>Fall. 3 credits. Prerequisites: EAS 4260 and permission of instructor. Offered alternate years; next offered 2009–2010. R. W. Allmendinger and C. Andronicos.</td>
<td></td>
</tr>
<tr>
<td>EAS 5240</td>
<td>Advanced Structural Geology</td>
<td>3</td>
<td>Fall. 3 credits. Prerequisites: EAS 4260 and permission of instructor. Offered alternate years; next offered 2009–2010. R. W. Allmendinger. Geometry, kinematics, and mechanics of structural provinces.</td>
<td></td>
</tr>
<tr>
<td>EAS 5530</td>
<td>Advanced Petrology</td>
<td>3</td>
<td>Fall. 3 credits. Prerequisite: EAS 4540. Offered alternate years; next offered 2009–2010. R. W. Kay.</td>
<td></td>
</tr>
<tr>
<td>EAS 5750</td>
<td>Planetary Atmospheres (also ASTRO 6575)</td>
<td>3</td>
<td>Fall. 4 credits. Prerequisites: undergraduate physics, vector calculus. Offered alternate years. P. Giersch.</td>
<td></td>
</tr>
<tr>
<td>EAS 5770</td>
<td>Planetary Surface Processes (also ASTRO 6577)</td>
<td>3</td>
<td>Spring. 3 or 4 credits. Offered alternate years. J. Bell.</td>
<td></td>
</tr>
<tr>
<td>EAS 5840</td>
<td>Inverse Methods in the Natural Sciences</td>
<td>3</td>
<td>Fall. 3 credits. Prerequisite: MATH 2940. Complete substantial class project. D. L. Hysell.</td>
<td></td>
</tr>
<tr>
<td>EAS 6280</td>
<td>Geology of Orogenic Belts</td>
<td>3</td>
<td>Spring. 3 credits. Prerequisite: permission of instructor. S. M. Kay.</td>
<td></td>
</tr>
<tr>
<td>EAS 6410</td>
<td>Analysis of Biogeochemical Systems</td>
<td>3</td>
<td>Spring. 2 credits. Prerequisite: MATH 2930 or permission of instructor. Offered alternate years. L. A. Derry.</td>
<td></td>
</tr>
<tr>
<td>EAS 6480</td>
<td>Air Quality and Atmospheric Chemistry (also MAE 6480)</td>
<td>3</td>
<td>Fall. 3 credits. Prerequisites: first-year 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.</td>
<td></td>
</tr>
<tr>
<td>EAS 6520</td>
<td>Advanced Atmospheric Dynamics (also ASTRO 7652)</td>
<td>3</td>
<td>Spring. 3 credits. Prerequisites: EAS 3410 and 3420 or equivalent. S. J. Colucci.</td>
<td></td>
</tr>
<tr>
<td>EAS 6560</td>
<td>Isotope Geochemistry</td>
<td>3</td>
<td>Spring. 3 credits. Open to undergraduates. Prerequisite: EAS 4550 or permission of instructor. Offered alternate years. W. M. White.</td>
<td></td>
</tr>
<tr>
<td>EAS 6660</td>
<td>Applied Multivariate Statistics</td>
<td>3</td>
<td>Spring. 3 credits. Prerequisites: multivariate calculus, matrix algebra, and two statistics courses. D. S. Wilks.</td>
<td></td>
</tr>
<tr>
<td>EAS 6750</td>
<td>Modeling the Soil-Plant-Atmosphere System (also CSS 6750)</td>
<td>3</td>
<td>Spring. 3 credits. Prerequisite: EAS/CSS 4830 or equivalent. S. J. Raha.</td>
<td></td>
</tr>
<tr>
<td>EAS 6920</td>
<td>Special Topics in Atmospheric Science</td>
<td>3</td>
<td>Fall, spring. 1–6 credits. S–U or letter grades. Staff.</td>
<td></td>
</tr>
</tbody>
</table>
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 7110  Upper Atmospheric and Space Physics
Fall or spring. 1–6 credits. L. H. Lysell. Seminar.

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
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 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.

EAS 7810  Exploration Geophysics
L. D. Brown.

EAS 7930  Andes-Himalaya Seminar

EAS 7950  Low-Temperature Geochemistry
1–5 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. 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. S–U or letter grades. Graduate faculty. Dissertation research for atmospheric science Ph.D. students only. Exams: before ‘A’ exam has been passed.

EAS 9510  Doctoral-Level Dissertation Research in Atmospheric Science
Fall, spring. Credit. 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

ECE 2910–2920  Sophomore Electrical and Computer Engineering Group Projects
2930–2939, fall; 2940–2949, spring. 1–8 credits.

ECE 2990  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, methods of images, reflection, 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 3060  Introduction to Quantum and Statistical Physics
Fall, 4 credits. Prerequisites: PHYS 2214, MATH 2940, and ECE 3150 or co-registration.

ECE 3100  Introduction to Probability and Random Signals
Fall, summer. 4 credits. Prerequisite: MATH 2940. May be used in place of ENGRD 2700 to satisfy engineering distribution requirement.

ECE 3110  Introduction to Probability as a Basis for Modeling Random Phenomena and Signals, Calculating the Response of Systems, and Making Estimates, Inferences, and Decisions in the Presence of Chance and Uncertainty. Applications are given in such areas as communications, device modeling, and information theory. Material includes:
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 tabs will accompany the progress in lectures for hands-on experiences.

**ECE 3200 Networks and Systems**
Fall. 4 credits. Prerequisites: ECE 2200 and MATH 2940. Next offered 2009–2010. 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 Fundamental ECE Mathematics**
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 3910–3920 Junior Electrical and Computer Engineering Independent Project**
3910, fall; 3920, spring. 1–8 credits. For description, see ECE 3910–3920.

**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 3930–3939; 3940–3949.

**ECE 4070 Physics of Semiconductors and Nanostructures**
Spring. 4 credits. Prerequisites: ECE 3060 or AEP 3610 and AEP 4230.
This course covers the basic 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 heterojunctions, 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, queueing processes, power spectral densities, Gaussian random process. Element 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: a 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 apply “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 4300 Lasers and Optical Electronics  
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)  
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/m-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 GHz. 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. Culuminating design experience (CDE) course. Prerequisite: ECE 3030 or equivalent.  
Physical principles of optical waveguides. Wave equation solutions to the mode structure in waveguides and 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 a course in probability.  
Design, analysis, and implementation of computer and communication networks and systems. This is a basic course in networking. Examples of topics that are covered include data transmission and data encoding, data link control, circuit vs. packet switching. Asynchronous Transfer Mode, local area network technology, network interconnections, protocol (OSI and TCP/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 applications 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 systems.

ECE 4520 Electric Power Systems II  
Spring. 4 credits. Prerequisite: ECE 3200 or permission of instructor.  
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. Culuminating 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. Last techniques for analog integrated circuits. Throughout the course, emphasis is placed on design-oriented analysis techniques.

ECE 4570 Silicon Device Fundamentals  
Fall. 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, BJTs, 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 actual 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 4670 Digital Communication Receiver Design  
Fall. 4 credits. Culuminating design experience (CDE) course. Prerequisite: ECE 2200.  
Next offered 2009–2010. Introduction to broadband digital receiver design. Topics include PAM and QAM modulation and down-conversion, pulse-shaping, matched filtering, carrier frequency and phase recovery, band-timing synchronization, packet marker synchronization, adaptive linear equalization, and coding. Course project: composition and testing of a MATLAB-based software receiver.

ECE 4680 Telecommunication Systems  
Spring. 4 credits. Prerequisite: ECE 4670 or permission of instructor. Recommended: ECE 4110. Next offered 2009–2010.  
Quadrature amplitude modulation receiver design, including I/Q mismatch compensation, carrier recovery (using Costas loop and phase-locked loop), baud-timing (using bandwidth power optimization), and adaptive equalization (trained, blind, fractionally spaced, and using decision feedback).

ECE 4720 Feedback Control Systems (also CHEME 4720, MAE 4780)  
Fall, spring. 4 credits. Prerequisites: CHEME 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. Culuminating 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. Culuminating 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 on 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 4950, 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; fundamentals of 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 interlial confinement fusion-reactor designs.

ECE 4870  Introduction to Radar and Remote Sensing (also EAS 4870)
Fall. 3 credits. Prerequisites: ECE 2200 and 4860 (or grade of B or better in ECE 3050). 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 4950–4990  Special Topics in Electrical and Computer Engineering
Spring. 1–4 credits.
Seminar, special interest, or temporary course.

ECE 5020  Biomedical System Design (also BME 5020)
Spring. 4 credits. Co- or prerequisite: 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 5120  Applied Systems Engineering I (also CEE/CS 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 MAE 5910.

ECE 5130  Applied Systems Engineering II (also CEE/CS 5050, MAE 5920, ORIE 5130, SYSEN 5200)
Spring. 3 credits. Prerequisite: ECE 5240/CS 5040, ECE/EE ORIE 5120, or MAE 5910.
For description, see MAE 5920.

ECE 5180  Principles of Medical Imaging (also VTMED 6180, BME 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 5200, or permission of instructor. Recommended: good background in linear algebra and calculus/complex variable equations. For description, see MAE 5210.

ECE 5310  Applied Quantum Optics for Photonics and Optoelectronics
Spring. 4 credits. Prerequisites: ECE 3060 and 4070, or PHYS 443. Next offered 2009–2010.
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 photonic states, vacuum fluctuations, noise and quantum Langevin equations, matter-phonon 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 Lasers
Fall. 4 credits. Prerequisites: ECE 4300, ECE 4570, or permission of instructor.
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 topics. A term project and paper are required.

ECE 5350  Semiconductor Physics
Fall. 4 credits. Prerequisites: ECE 4070 and 4570, or permission of instructor. Offered alternate years from ECE 5370.
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; next offered 2009–2010.
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 5480  Digital Image Processing
Spring. 4 credits. Prerequisites: ECE 4110, ECE 4250, and familiarity with linear algebra. Next offered 2009–2010.
Introduction to image processing through seven major topics: perception, statistical modeling, transforms, enhancement, analysis, compression, and restoration. Special attention is allocated to compression. Equal emphasis is placed on gaining a mathematical and an intuitive understanding of algorithms through actual image manipulation and viewing.

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 systems, 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.
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 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 coding. Channel capacity and rate-distortion functions. Coding theorems and converses for classical and multiterminal configurations. Gaussian sources and channels.

[ECE 5640 Detection and Estimation](#)
Spring. 4 credits. Prerequisites: ECE 3100, 4110, or permission of instructor. Next offered 2009–2010.

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 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 5720 Parallel Computer Architecture (also CS 5722)
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 5740 Advanced Digital VLSI](#)
Fall. 4 credits. Prerequisites: ECE 3140 and ECE 4740. Next offered 2009–2010.
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 computer 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- and multicores, the course will also cover 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 5780 Computer Analysis of Biometric Images
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, courses 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 5810 Introduction to Plasma Physics
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. 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 school work). 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.
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 5870 Energy Seminar I (also CHEM 5870, MAE 5450)
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 CHEM 5880, MAE 5460)
Spring. 1 credit.
For description, see ECE 5870; however, different speakers and/or topics are discussed in ECE 5880.

ECE 5930-5990  Advanced Topics in Electrical and Computer Engineering
Fall, spring. 1–4 credits.
Seminar, special interest, or temporary course.

ECE 6100  Graduate Seminar in Medical Instrumentation
Fall. 1 credit. S–U grades only. Offered alternate years; next offered 2009–2010.
The seminar will provide a format for identifying, investigating, and discussing state-of-the-art developments related to instrumentation, analysis techniques, and simulation sciences as they apply to biomedical problems and solutions.

ECE 6680  Foundations of Probability and Probabilistic Reasoning
Spring. 3 credits. Prerequisites: a course in standard probability such as ECE 3100, ECE 4110, ORIE 6510 and some exposure to statistical reasoning, such as ECE 5606. Offered alternate years. Next offered 2009–2010.
An examination of issues in the interpretations and axiomatizations of probability and of the connections between probability and probabilistic reasoning. Emphasis will be placed upon such alternative mathematical models of probability as are provided by modal, order relations, interval-valued, and sets of measures. These models will be related to interpretations of probability that include the familiar frequency of occurrence, computational complexity, classical, subjective, epistemic, and propensity. This course requires only a familiarity with standard numerical probability and some of its applications. However, mathematical maturity, in the sense of comfort when faced with new mathematical ideas that will be fully defined, will be valuable in dealing with new probability concepts.

ECE 6850  Seminar in GPS and GNSS
Fall. spring. 1–3 credits. Prerequisite: ECE/MAE 4150 or equivalent.
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  Master of Engineering Design
Fall and spring. 3–9 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 section number. To register, see roster for appropriate six-digit course ID numbers.

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.

ECE 7950–7990  Master of Engineering Thesis Research
7950. fall; 7960, 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

INFO 1301  Introduction to Programming Web Applications
Fall, weeks 1–7. 2 credits. Students must enroll in both INFO 1301 and 1302.
For description, see INFO 1301 in CIS section.

INFO 1302  Introduction to Designing Web Applications
Fall, weeks 8–14. 2 credits. Students must enroll in both INFO 1301 and 1302.
Prerequisite: successful completion of INFO 1301.
For description, see INFO 1302 in CIS section.

INFO 2040  Networks (also ECON 2040, SOC 2120) (SBA)
Spring. 4 credits.
For description, see ECON 2040.

INFO 2140  Cognitive Psychology (also CS/PSYCH 2140) (KCM)
Fall. 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 1301 and 1302 strongly recommended.
For description, see INFO 2300 in CIS section.

INFO 2310 Topics in Web Programming and Design
Fall. weeks 1–10. 1 credit.
Prerequisite: INFO 2300.
For description, see INFO 2310 in CIS section.

INFO 2450  Psychology of Social Computing (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)
Spring. 3 credits.
For description, see COMM 3200.

INFO 3300  Data-Driven Web Applications (also CS 3300)
Spring. 3 credits. Prerequisite: CS 2110.
For description, see INFO 3300 in CIS section.

INFO 3450  Human–Computer Interaction Design (also COMM 3450) (SBA)
Spring. 3 credits.
For description, see COMM 3450.

INFO 3490  Media Technologies (also COMM 3490, STS 3491) (CA)
Spring. 3 credits. Offered odd-numbered years.
For description, see COMM 3491.

INFO 3551  Computers: From the 17th Century to the Dotcom Boom (also STS 3551) (HA)
Fall. 4 credits.
For description, see STS 3551.

INFO 3650  Technology in 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 3650) (CA)
Fall. 4 credits. Next offered 2009–2010.
For description, see ARTH 3650.

INFO 3720  Explorations in Artificial Intelligence (also CS 3700)
Spring. 3 credits. Prerequisites: MATH 1110 or equivalent, an information science approved statistics course, and CS 2110 or permission of instructor. Next offered 2009–2010.
For description, see INFO 3720 in CIS section.

INFO 3871  The Automatic Lifestyle: Consumer Culture and Technology (also STS 3871) (CA)

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 6390)
Spring. 3 credits. Prerequisites: background in computing, data structures, and programming at level of CS 2110 or equivalent; experience using information systems. Undergraduate and master's students should register for INFO 4350; Ph.D. students should register for INFO 6350.
For description, see INFO 4350 in CIS section.

INFO 4400 Advanced Human-Computer Interaction Design (also COMM 4400) (SBA)
Fall. 3 credits. Prerequisite: INFO 2450.
For description, see COMM 4400.

[INFO 4144 Responsive Environments (also ARTH 4144) (CA)]
For description, see ARTH 4144.

[INFO 4450 Seminar in Computer-Mediated Communication (also COMM 4450)]
Fall. 3 credits. Prerequisite: INFO 2450. Next offered 2009–2010.
For description, see COMM 4450.

INFO 4470 Social and Economic Data (also ILLRLE 4470)
Spring. 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. Next offered 2009–2010.
For description, see COMM 4500.

[INFO 4850 Computational Methods for Complex Networks]
Spring. 3 credits. Prerequisites (2): ECON/INFO 2040/SOC 2090/CS 2850 or equivalent knowledge; CS 2110 or INFO 2500 or equivalent knowledge of basic programming.
For description, see INFO 4850 in CIS section.

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
Fall. 4 credits.
For description, see INFO 5150 in CIS section.

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 6002 Critical Technical Practices]

INFO 6140 Cognitive Psychology (also COGST/PSYCH 6140)
Fall. 4 credits.
For description, see PSYCH 6140.

[INFO 6144 Responsive Environments (also ARTH 6144)]
For description, see ARTH 6144.

INFO 6300 Advanced Language Technologies (also CS 6740)
Fall or spring. Next offered fall 2008. 3 credits. Prerequisite: permission of instructor. Neither INFO/CS 4350 nor CS 4740 are prerequisites.
For description, see CS 6740 in CIS section.

INFO 6350 Seminar on Applications of Information Science (also INFO 4350)
Spring. 3 credits. Prerequisites: background in computing, data structures, and programming at level of CS 2110 or equivalent; experience in using information systems. Undergraduates and master's students should register for INFO 4350; Ph.D. students should register for INFO 6350.
For description, see INFO 4350 in CIS section.

INFO 6400 Human-Computer Interaction Design (also COMM 6400)
Fall. 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. Next offered 2009–2010.
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. For description, see LING 6648.

[INFO 6500 Language and Technology (also COMM 6500)]
Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. Next offered 2009–2010.
For description, see COMM 6500.

INFO 6580 The Structure of Information Networks (also CS 6850)
Fall. 4 credits. Prerequisite: CS 4820.
For description, see INFO 6850 in CIS section.

INFO 7090 IS Colloquium
Fall, spring. 1 credit. For staff, visitors, and graduate students interested in information science.

INFO 7470 Social and Economic Data (GR-RDC) (also ILLRLE 7400)
Spring. 4 credits. Prerequisite: Ph.D. and research master's students.
For description, see INFO 7470 in CIS section.

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


Undergraduate Courses

MSE 1110 Nanotechnology (also ENGR 1110)
Fall. 3 credits. E. Giannelis.
Course in Introduction to Engineering series. For description, see ENGR 1110.

MSE 1180 Design Integration: DVDs and iPods (also ENGR/TAM 1180)
Spring. 3 credits. Course in Introduction to Engineering series. For description see ENGR 1180.

MSE 1190 Biomaterials for the Skeletal Systems (also ENGR 1190)
Fall. 3 credits. D. Grubb.
Course in Introduction to Engineering series. For description, see ENGR 1190.

MSE 1810 MSE At Cornell: an Introduction for Freshman
Spring. 1 credit. S–U or letter grade; grade based on class participation and a 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: 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 & E 1910-1920 Research Involvement Ia and Ib
Fall, 1910; spring, 1920. 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. C. Liddell.
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. Corequisites: 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. Corequisites: PHYS 2213 or permission of instructor. C. Umbach.
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. L. Estroff. 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, solution systems, 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; diffusion 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. R. B. van Dover. 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, magnetoresistance. 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. Umbach. For description, see MSE 4070.

**MSE 3110 Junior Laboratory I**
Fall. 1 credit. D. Ast. 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. D. Ast. 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 I and II**
Fall. 3910: 3 credits. 3920: 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. 5 credits. Prerequisite: MSE 2060, Corequisite: MSE 5840 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: 4 credits. 4040, spring. 3 credits each semester. Staff. 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. Umbach. 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, 3910, 3940 or permission of instructor. S. Baker. Next offered 2009–2010. 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 microelectronic, mechanical 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. Next offered 2009–2010. 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. D. Grubb. 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 are investigated. Constraints such as methods of production, economical, 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. 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 2123 and 2214 or equivalents. Offered if sufficient demand.
For description, see ECE 4820.

MSE 4870  Ethics and Technology
Spring. 1 credit. 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. 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 micromembranes. 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 2009–2010.
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
Fall. 3 credits. Prerequisite: ENGRD 2610. Corequisite: MSE 5030 or permission of instructor. C. Ober.

[MSE 5230  Physics of Soft Materials]
Fall. 3 credits. Next offered 2009–2010.
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 and 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 5250  Organic Optoelectronics]
The course begins with an overview of relevant materials, from small aromatic molecules to conjugated polymers. We then discuss their optoelectronic properties, including topics from photophysics (absorption, emission, photogeneration, recombination), charge transport and injection (doping, hopping, disorder) and nonlinear optics. Molecular conduction mechanisms are reviewed. Their applications in electrophotography, light-emitting diodes, lasers, photovoltaic cells, thin film transistors are then discussed.

MSE 5310  Introduction to Ceramics
Spring. 3 credits. Prerequisites: all MSE 2000- and 3000-level core courses. 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), chemical 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. Next offered 2009–2010.
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]
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]
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 surfactant 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.
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.
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]
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 3030/6030 or equivalent. R. Hennig. Next offered 2009–2010.
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)
Spring. 3 credits. L. Estroff. 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. S. 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. R. B. van Dover. For description, see MSE 3050.

MSE 5870 Technology Management (also MSE 4810)
Spring. 3 credits. E. P. Giannelis. For description, see MSE 4810.

MSE 5890 Colloids and Colloid Assemblies for Advanced Materials Applications (also MSE 4890)
Fall. 3 credits. C. Liddell. For description, see MSE 4890.

Graduate Core Courses

MSE 6010 Chemistry of Materials
Spring. 3 credits. Prerequisite: thermodynamics coursework 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.
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

MSE 6040 Kinetics of Reactions in Condensed Matter
Spring. 3 credits. R. Dieckmann. Phenomenological 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 croushing 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. Schom. 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-dimensionalality 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. Next offered 2009–2010. J. Blakely.
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/reversal 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 4800)

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. Next offered 2009–2010. For description, see MSE 4100.

MSE 6210 Advanced Inorganic Chemistry II: Solid State Chemistry (also CHEM 6070)
Spring. 4 credits. Prerequisite: CHEM 6050 or permission of instructor. S. Lee. For description, see CHEM 6070.

MSE 6650 Composite Materials (also MAE/TAM 6650)
Spring. 4 credits. Staff. For description, see TAM 6650.

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.

[MSE 6810 Surfaces and Interfaces in Materials]
Deals with special topics in surface and interface science. The main topics are: statistical thermodynamics of interfaces, morphological stability, atomic structure, energetics and structure determination, electronic structure of interfaces, charge and potential distributions, surface steps, adsorption and segregation, atomic transport and growth processes at surfaces, oxidation, and other surface reactions.

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**


**MAE 1110 Naval Ship Systems (also NAVS 2020)**
Fall. 3 credits.
For description, see NAVS 2020.

**MAE 1130 Introduction to Computer-Aided Manufacture (CAM)**
Fall, approx. eight weeks (total 15 hrs. of instruction and 15 hrs. of lab). 1 credit. Limited enrollment. Prerequisites: MAE 2250 or equivalent experience and completion of Emerson Lab Product Realization Facility's CNC seminars. An Introduction to CNC Machining and CNC Programming; or permission of instructor. Completes the introduction to the fundamentals of computer-aided manufacture (CAM) seminars through the use of computer numerical control (CNC) programming. The course is the hands-on component of the three-part series on CAM. Provides practical applications of CAM via 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 Lab's Product Realization Facility for team or research projects. May not be used to fulfill any MAE requirement.

**MAE 1170 Introduction to Mechanical Engineering (also ENGR 1170)**
Fall. 3 credits. 2 lec and 1 lab per week.
Course in Introduction to Engineering series. For description, see ENGR 1170.

**MAE 1270 Introduction to Entrepreneurship and Enterprise Engineering (also ENGR 1270)**
Spring. 3 credits. Open to all Cornell students regardless of major. Prerequisites: none.
For description, see ENGR 1270.

**MAE 2120 Mechanical Properties and Selection of Engineering Materials**
Spring; may be offered in summer. 3 credits. Prerequisites: ENGRD/TAAM 2010 (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 selection of material associated with mechanical design is provided with candidate material systems coming from metals, polymers, ceramics and/or composites. A general overview of material 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 2030. 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 EEE 2220 and one of the following fluid mechanics classes: MAE 3230 or CHEM 3240 or EEE 3310 or ECE 3310; upper-level engineers or permission of instructor.

**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 covered 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, MSE 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. Prerequisites: ENGRD 2030 and ENGRD 2210 and pre- or co-registration in ENGRD 2210, or permission of instructor. Limited to ME majors and those officially registered for the AE or ME minor. Topics include physical properties of fluids, hydrostatics, conservation laws using control volume analysis and using differential analysis, Bernoulli’s equation, potential flows, simple visous 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 2030 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 electromechanical devices such as electromagnetic systems; piezoelectric and shape memory material transformation; 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.

[M]AE 4000  Components and Systems: Engineering in a Social Context (also STS 4001)
Spring. 3 credits. Prerequisites: upper-class standing, two years of college physics, Offered alternate years; next offered 2009–2010. 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. "Senior Design Elective" if students sign up for the corresponding section of MAE 4291. Co-meets with MAE 5000.

MAE 4040  Materials Selection for Clean Mechanical Designs
Spring. 3 credits. Prerequisites: MAE 2120, MAE 3250. Pre- or corequisite MAE 3272. "Senior Design Elective" for M.E. students who enroll concurrently or after MAE 4291. Offered alternate years. Advanced material selection concepts, which build of the fundamentals of materials index developed in MAE 2120 and 3250, including processes 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 2722 or equivalent; senior standing in MAE. "Senior Design Elective" for M.E. students who enroll in the corresponding section of MAE 4291. Offered alternate years; next offered 2009–2010. 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 mechanisms 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. Prerequisite: MAE 3280 or equivalent; engineering mechanics at level of MATH 2930 and MATH 2940 (Engineering Mathematics); some course in dynamics at level of TAM/ENGRD 2050 (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-code are used. Co-meets with MAE 5170.

MAE 4230  Intermediate Fluid Dynamics
Spring. 3 credits. Prerequisite: MAE 3220 (Introductory Fluid Mechanics) or CEE 3310/BEE 3310 or permission of instructor. 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 some exact solutions to the Navier-Stokes equations, boundary layers, wakes and jets, separation, convection, buoyancy, instabilities, and turbulence. "Senior Design Elective" if M.E. seniors enroll in the corresponding section of MAE 4291. Co-meets with MAE 5230.

MAE 4250  FSAE Automotive Design Project
Fall, spring. Usually 3 credits: 3 for team members or 4 for team leaders. Prerequisite: MAE or ECE juniors and seniors or permission of instructor. 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.

"Senior Design Elective" if M.E. seniors enroll in the corresponding section of MAE 4291.

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, fluid visualization, and spark ignition engine performance. Instrumentation, techniques and analysis, and interpretation of results. Lab 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 in 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, 4250, 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 428. 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 4490  Combustion Engines and Fuel Cells
Spring. 3 credits. Prerequisites: ENGRD 2210 and MAE 3230. Offered alternate years; next offered 2009–2010. 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 CHEM 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 2090 and ENGRD 2050 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 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 plans 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 4630 Neuromuscular Biomechanics (also BME 4630)]

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 5660. Offered alternate years.
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 coursework 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. 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).
Term project. "Senior Design Elective" if M.E. seniors enroll in the corresponding section of MAE 4291. Co-meets with MAE 5700.

MAE 4770 Engineering Vibrations
Spring. 3 credits. Pre- or corequisite: MAE 3260 or permission of instructor. 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.
Co-meets with MAE 5770.

MAE 4780 Feedback Control Systems (also CHEM 4780, also MME 4780)
Fall. 4 credits. Prerequisites: CHEM 3720 or MAE 3260 or permission of instructor. 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. Co-meets with MAE 5780.

MAE 4860 Automotive Engineering
Spring. 3 credits. Prerequisites: ENGRD 2020 or permission of instructor. Selected topics in the analysis and design of vehicle components of 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. "Senior Design Elective" if M.E. seniors enroll in the corresponding section of MAE 4291.

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. 3 variable credits. Prerequisite: permission of instructor.
Students serve as teaching assistants in Cornell mechanical engineering courses or in local middle school technology classes. 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.

[MAE 5000 Components and Systems: Engineering in a Social Context]
Spring. 3 credits. Prerequisites: graduate standing or permission of instructor, two years of college physics. Offered alternate years; next offered 2009–2010. Co-meets with MAE 4000. For description, see MAE 4000.

MAE 5010 Future Energy Systems
Spring. 3 credits. Prerequisites: ENGRD 2210 (Thermodynamics) or equivalent. Recommended: MAE 3200 (Introductory Fluid Mechanics), MAE 3240 (Heat Transfer), or equivalent open to 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 lower-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; next offered 2009–2010.

MAE 5070 Dynamics of Flight Vehicles
Spring. 3 credits. Prerequisites: MAE 3050 (Introduction to Aeronautics) and MAE 3260 (System Dynamics) or permission of instructor. Offered alternate years.
MAE 5130 Mechanical Properties of Thin Films (also MSE 5120)
Spring. 3 credits. Offered alternate years; next offered 2009–2010. 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 an equivalent CAD–based design course, plus 2.5 years of engineering mathematics through probability and statistics. Next offered 2009–2010. 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, design tolerances, and inspection gauges from part and assembly specifications, and understand the limitations and future directions of tolerancing technology.

MAE 5210 Theory of Linear Systems (also ECE 5210)
Fall. 3 credits. Prerequisite: ECE 5200 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, realizability theory. At the level of Linear Systems by Kailath.

MAE 5230 Intermediate Fluid Dynamics
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. 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 CDF 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, 7500, and 7570. Co-meets with MAE 4230.

MAE 5240 Physics of Micro- and Nanoscale Fluid Mechanics (also CHEM 5240)
Fall. 3 credits. Prerequisite: undergraduate fluid or continuum mechanics (e.g., MAE 3230) or permission of instructor. 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. Co-meets with MAE 6240.

MAE 5430 Combustion Processes
Fall. 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 covered include thermochemistry, kinetics, vessel explosions, laminar premixed and diffusion flames, and droplet combustion. Optional topics may include complex reacting 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 5860)
Spring. 1 credit. For description, see ECE 5880.

MAE 5630 Neuromuscular Biomechanics
MAE 5640 Orthopaedic Tissue Mechanics
Spring. 3 credits. Graduate version of MAE 4610. Offered alternate years. For description see MAE 4610.

MAE 5650 Biomechanical Systems—Analysis and Design (also BME 5650)
MAE 5680 Soft Tissue Biomechanics
Fall. 3 credits. For description, see BME 5680.

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
Fall. 3 credits. Prerequisites: graduate standing, seniors with ENGRD/TAM 203, MAE 3260 or permission of instructor. Next offered 2009–2010. Introduces multibody dynamics; dynamics of rigid bodies: Newton–Euler methods, Lagrangian dynamics, principle of virtual power (Kane–Jourdain methods); and applications to robotics, space dynamics of satellites, electric-mechanical systems. Introduction to multibody simulation using Working Model.

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 5910 Applied Systems Engineering (also CEE/CS 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 I (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
Spring. 4 credits. Prerequisite: MAE 6010. Analysis and discussion of a wide range of specific flows and flow regimes characterized by high Reynolds number are provided. Potential flows, conformal transformations, slender-body theory, and Kelvin’s impulse are included. Laminar viscous flows are studied, including fully diffused flows, exact solutions, and boundary layers. Compressible flows are treated, including propagation and viscous decay of sound and shock waves and their decay, and the method of characteristics for analysis of such problems. Stratified flows, especially gravity and capillary waves, are analyzed. Stability of a particular high Reynolds number flow is discussed. Finally, certain low Reynolds number flows associated with creeping motions or with ultra-small scale are described.

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 is required; some experience with MATLAB is expected. Offered alternate years. 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
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. Offered alternate years; next offered 2009–2010.
Behavior of an ideal gas is considered at the microscopic level. Introduction to kinetic theory—the velocity distribution function, molecular collisions, and Boltzmann equation; to quantum theory—postulates of quantum mechanics, rigid rotor, harmonic oscillator, one-electron and multi-electron atoms and molecular structure; and to statistical mechanics—the partition function, relation to thermodynamics, calculations of thermodynamic properties.

**MAE 6240 Physics of Micro- and Nanoscale Fluid Mechanics**
Fall. Prerequisite: undergraduate fluid or continuum mechanics (e.g., MAE 3250) or permission of instructor. Graduate version of MAE 5240. Includes additional 1-credit design project. Co-meets with MAE 5240.

For description, see MAE 5240.

**[MAE 6270 Experimental Methods in Fluid Dynamics (also CEE 6370)]**
For description, see CEE 6370.

**MAE 6310 Turbulence and Turbulent Flows**
Fall. 4 credits. Prerequisite: MAE 6010 (Foundations of Fluid Dynamics and Aerodynamics), graduate standing, or permission of instructor.
Topics include the dynamics of buoyancy and shear-driven turbulence, boundary-free and bounded shear flows, second-order modeling, the statistical description of turbulence, turbulent transport, and spectral dynamics.

**MAE 6320 Multiphase Turbulence: Particulates, Drops, and Polymer Suspensions**

**[MAE 6340 Computational Combustion]**
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. Offered alternate years. S. B. Pope. Next offered 2009–2010.
Examines laminar and turbulent flames and the fundamental chemical and transport processes involved. Emphasis is on using computational tools (Chemkin and Fluent) to calculate flame properties, which are compared to experimental data. Topics covered include thermodynamic equilibrium, chemical kinetics, reactor studies, conservation equations, transport properties, laminar premixed and non-premixed flames, turbulent jets, turbulence modeling, and PDF models of non-premixed turbulent combustion. A knowledge of classical turbulence (as at the level of MAE 5430, Combustion Processes, is useful but not required.)

**MAE 6450 Turbulent Reactive Flow**
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. Offered alternate years. Next offered 2009–2010.
Large turbulent reactive flows occur in combustion devices, the chemical process industry, the atmosphere, oceans, and elsewhere. In the last decade, substantial progress has been made in the understanding of these flows, through both experimental and computational approaches. This course focuses on turbulent combustion and describes the different phenomena involved, the basis on which the governing equations, experimental techniques and observations, and a range of modeling approaches. Class meets, on average, twice per week.

**[MAE 6480 Air Quality and Atmospheric Chemistry (also EAS 6480)]**
Fall. 3 credits. Prerequisites: first-year chemistry and thermodynamics (or equivalent) and fluid mechanics (or equivalent); graduate standing or permission of instructor. Next offered 2009–2010.
Factors determining air quality and effects of air pollutants on public health, ecological systems and global climate change. Students will examine the 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)**
Fall. 4 credits. Not offered every year.
For description, see CS 7726.

**[MAE 6510 Conduction and Radiation Heat Transfer]**
Fall, weeks 1–7. 2 credits. Prerequisite: graduate standing; undergraduates by permission of instructor. Next offered 2009–2010.
An advanced treatment of heat conduction and thermal radiation from a theoretical perspective. Topics include: development of the conductive transport equation in integral and differential forms; the transport theorem; solutions for steady state and transient conditions; moving boundary effects including melting and solidification; introduction to radiation including black body and gray body radiation, the radiative transport equation and radiation in an absorbing and scattering medium. At the level of Conduction Heat Transfer, by V. Arpaci, and Radiation Heat Transfer, by E. M. Sparrow and R. D. Cess.

**[MAE 6520 Convection Heat Transfer]**
Fall, weeks 8–14. 2 credits. Prerequisite: graduate standing; undergraduates by permission of instructor. Next offered 2009–2010.
An advanced treatment of convection heat transfer from a theoretical perspective. Topics include: conservation of linear momentum in integral and differential forms; boundary layer flows with emphasis on laminar conditions (some introduction to turbulence also included); internal and external flows; forced and free convection; theoretical solutions and scale analysis. At the level of Convection Heat Transfer, by A. Bejan, and Convective Heat and Mass Transfer, by W. M. Kays et al.

**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: graduate undergraduate heat transfer recommended (e.g., MAE 3240) or permission of instructor. Next offered 2009–2010.
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 to be covered include: a brief review 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 6630 Neural Control (also BME 6630)]**

**[MAE 6640 Mechanics of Bone (also BME 6640)]**
Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. Offered alternate years; next offered 2009–2010.
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/MAE 6650)**
Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. L. Bonassar. For description, see BME 6650.

**[MAE 6750 System Identification and Control]**

**[MAE 6760 Model-Based Estimation]**
Spring. 4 credits. Prerequisites: linear algebra, differential equations, and MATLAB programming. Open to M.S./Ph.D. students or permission of instructor. Offered alternate years; next offered 2009–2010.
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 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, worst case/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 the 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. Prerequisites: graduate standing or permission of instructor. 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. Prerequisites: TAM 6630 or equivalents. Offered alternate years. 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 scales; methods for evaluation of effective elastic and plastic moduli; evolution of orientations and orientation distributions with deformations; 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
Spring. 4 credits. Prerequisite: TAM 6630 or equivalents. Offered alternate years. 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 scales; methods for evaluation of effective elastic and plastic moduli; evolution of orientations and orientation distributions with deformations; applications to polycrystalline solids (metal alloys and minerals), composite materials, biomaterials (soft tissues), and polymers.

MAE 7340 Analysis of Turbulent Flows

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. 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. Presentation 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 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.

NAE 4310 Introduction to Nuclear Science and Engineering (also AEP/CHEME/ECE/TAM 4130, MAE 4560)
Fall. 3 credits. Prerequisites: PHYS 2214 and MATH 2940. For description, see TAM 4130.

NAE 4840 Introduction to Controlled Fusion: Principles and Technology (also AEP/ECE 4840, MAE 4950)
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.

NAE 5450 Energy Seminar (also ECE 5870, MAE 5450)
Fall, spring. 1 credit each semester; credit both semesters. D. A. Hammer. For description, see ECE 5870.

NAE 5900 Independent Study
Fall, spring. 1–4 credits. Letter or S–U grades. Staff. Independent study or project under guidance of a faculty member.

NAE 5910 Project
Fall, spring. 1–6 credits. Staff. Master of engineering or other project under guidance of a faculty member.

NAE 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 sitting and safety, fluid flow and heat transfer, control, environmental effects, and radiation protection.
OPERATIONS RESEARCH AND INFORMATION ENGINEERING


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 graphical information systems. Statistical techniques include multiple linear regression, classification, logistic regression, and time series forecasting. Industrial systems analysis includes factor analysis, principal component analysis, 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: ORIE 3300 or equivalent.
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, materials planning, cost estimation, inventory planning, and quality engineering.

ORIE 3310 Optimization II
Spring and summer. 4 credits. Prerequisite: ORIE 3300 or equivalent.
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: 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: 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
Fall. 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 replacement policy 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-class 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 3510/5510. Next offered 2009–2010.
Emphasizes modeling complicated decision problems as linear programs, integer programs, or highly structured nonlinear programs. Besides modeling, students are required to assimilate material 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.
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
Fall. 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; 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 2220 or 2940 or permission of instructor.
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 to interesting mathematical questions and a long, rich, and fractious 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
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 2009–2010.
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 2009–2010. Covers 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 computing experience. 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. This is an introduction to the most important notions and ideas in modern financial engineering, such as arbitrage, pricing, derivatives, option 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 4620 Operations Research Tools for Financial Engineering](#)**

Spring. 3 credits. Prerequisites: engineering math through MATH 2940 and ENGRD 2700 and ORIE 3500. No previous knowledge of finance required. Next offered 2009–2010. 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](#)**


**[ORIE 4711 Experimental Design](#)**


**[ORIE 4712 Regression](#)**


**[ORIE 4740 Statistical Data Mining I](#)**

Fall. 4 credits. Prerequisites: ORIE 3500 and MATH 2940 or equivalent; or permission of instructor. Examines the statistical aspects of data mining, the effective analysis of large data sets. 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 data sets 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. Prereq- or corequisites: CS/ENGRD 2110, plus either ORIE 3800 or 5120. 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 use 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 2009–2010. 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 3500 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](#)**

Spring. 3 credits. Prerequisites: ORIE 3510, or permission of instructor. Next offered 2009–2010. 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 5101 Design of Manufacturing Systems](#)**

Fall. 4 credits. Prerequisite: ORIE seniors and graduate students in engineering and business school; permission of instructor. 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 3500, 3550. Next offered 2009–2010. Topics include production planning, including MRP, linear programming, and related concepts. Scheduling and sequencing work in manufacturing systems; job shop 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. 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: one of the following: ORIE 3120, 4100, 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, supply chain dynamics, control, design, re-engineering. Covers the relationship between the supply chain and the company’s strategic position relative to its clients and its

---

**[ORIE 5126 Supply Chain Management](#)**

Spring. 3 credits. Prerequisites: one of the following: ORIE 3120, 4100, 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, supply chain 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 intercorporate relationships with partners, including decision-making, incentives, and risk.

ORIE 5130 Service System Modeling and Design
Spring. 3 credits. Corequisites: ORIE 3310, 3510; ability to program simple algorithms in some appropriate environment (e.g., VisualBasic or MATLAB).

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 5140.

ORIE 5142 Systems Analysis Architecture, Behavior, and Optimization (also CEE/CIS 5050, ECE 5130, MAE 5920)
Spring. 4 credits. Prerequisites: 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: M.Eng. students. Not open to freshmen.
Spring. 3 credits. Prerequisite: permission of instructor. Next offered 2009–2010.
Covers basic queueing 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; queueing networks; the product formula; time sharing; server vacations; and applications to equipment maintenance, computer operations and flexible manufacturing systems.

ORIE 5550 Applied Time-Series Analysis
Fall. 3 credits. Prerequisites: ORIE 3510 and ENGRD 2700 or permission of instructor.
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 5510 or permission of instructor.
Covers basic queueing 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; queueing 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 5500 (may be taken concurrently) and computing experience.
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.

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
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 5610, 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
Fall. 4 credits. Prerequisite: ORIE 5510.
Credit risk refers to losses due to changes in the credit quality of a counterparty 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: ORIE M.Eng. students.
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 4740.
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 4650 instead.

ORIE 5650 Quantitative Methods of Financial Risk Management
Spring. 3 credits. Prerequisite: ORIE 3500.
A historical perspective of market risk management 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-VA, 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. Prerequisites: Limited to 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.
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 Special Topics in Financial Engineering**
Fall. 1–8 credits. Prerequisites: Limited to Financial Engineering M.Eng. students in Manhattan.
Module-based course 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. 8 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 enrols 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. Prerequisites: Limited to 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.
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 6900, 6500 and 6700. Next offered 2009–2010.
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 also 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.
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.
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**
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.

**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. Next offered 2009–2010.
Topics in combinatorics, graphs, and networks, including matching, matroids, polyhedral combinatorics, and optimization algorithms.

**ORIE 6335 Scheduling Theory**
Fall. 3 credits.
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 approximation algorithms and on related complexity issues.

**ORIE 6336 Integer Programming**
Fall. 3 credits. Prerequisite: ORIE 6300.
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 4300 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 and 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 processes and applications to diffusion processes, weak convergence for stochastic processes, and topics selected from: Brownian motion, martingales, 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. 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
Fall. 3 credits. Prerequisite 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, Ito 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 2009–2010.
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.
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.
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. Next offered 2009–2010.
Priors, posteriors, 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, manufacture, market, 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.

**SYSTEMS ENGINEERING**


**SYSEN 1100 Getting Design Right: A Systems Approach**
Summer six-week session. 2 credits. Web-delivered. Instructor: Peter 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 DMEODVI (Define, Measure, Explore, Optimize, Design, Verify, and Iterate). The process begins with understanding customer requirements and ends with validating the design against 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. Pre-requisites: high school mathematics and science, and familiarity with spreadsheet modeling (e.g., MS Excel).

**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 a 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 majoring 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 a 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 5910, 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. 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.

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 Continuing Education enroll in SYSEN 5210. Course is identical for all versions.

**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**
Fall. 3–4 credits. Prerequisites: SYSEN 5100 and 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**
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**
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 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**

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 2009. 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 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.
TAM 1140 Design Integration: DVDs and iPads (also ENGR 1180)  
Spring. 3 credits. Next offered 2009–2010. Course in Introduction to Engineering series. For description, see ENGR 1190.  

TAM 2030 Dynamics (also ENGRD 2030)  
Fall, spring. 3 credits. Prerequisite: PHYS 1112, co-registration in MATH 1920, or permission of instructor.  
For description, see ENGRD 2030.  

TAM 3110 Introduction to Applied Mathematics II  
Spring. 3 credits. Prerequisite: MATH 2940 or equivalent (TAM 3110 can be taken independently of TAM 3100). Next offered 2009–2010.  

TAM 3120 Advanced Mathematical Modeling-Biological and Fluid Dynamics  
Spring. 3 credits. Covers the fundamentals of fluid dynamics that arise in biological fluid dynamics such as the motion of the microscale cells in low Reynolds number flows and unsteady aerodynamics of flapping flight and free falling objects. The topics in fluid dynamics include the 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 3180 Topics in Applied Mathematics  

TAM 4550 Introduction to Composite Materials (also CEE 4770, MAE 4550, MSE 5550)  
Fall. 3 credits. Prerequisite: ENGRD 2030. 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 5930 Master of Engineering Design Project I  
Spring. 3–12 credits, variable. M.Eng. (mechanics) project related to the master of engineering in mechanics.  

TAM 5950 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 2009–2010. 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 2009–2010. Also covers nonlinear rate-independent, small-scale deformation fracture mechanics: plastic fracture, J-integrals.  

TAM 7540 Topics in Continuum Mechanics  
Spring. 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 2009–2010. Topics include a variety of applications of the boundary element method. Examples are: potential theory, linear elasticity, elastoplasticity, micro and nano-electromechanical 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 2950 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** Spring. 3 credits. Next offered 2009–2010. Waves in one-dimensional elastic solids; two-dimensional systems; waves in infinite media, plates and rods; significant emphasis on measurement and applications.

**TAM 6710 Hamiltonian Dynamics** Spring. 3 credits. Prerequisite: TAM 5700 or equivalent. Next offered 2009–2010. Course topics include review of Lagrangian mechanics, Kanes equations, Hamilton’s principle, Hamilton’s equations, Lie transforms, Hamilton-Jacobi theory; KAM theory; and Melnikov’s method.

**TAM 6720 Celestial Mechanics (also ASTRO 6579)** Spring. 3 credits. Topics include description of orbits; 2-body, 3-body, and n-body; Hill curves, libration points and their stability; capture problems; oscillating orbital elements, perturbation equations; effects of gravitational potentials, atmospheric drag, and solar radiation forces on satellite orbits; and secular perturbations, resonances, 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 2009–2010. Topics include gravitational potentials, planetary gravity fields, free and forced rotations; Chandler wobble, polar wander, and damping of nutation.

**TAM 6750 Nonlinear Vibrations** Fall. 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 7680 Elastic Waves in Solids** Fall. 3 credits.

**TAM 7760 Applied Dynamical Systems (also MATH 7170)** Spring. 4 credits. For description, see MATH 7170.

**TAM 7609 Mechanics of Terrestrial Locomotion** Spring. 3 credits. Prerequisite: TAM 5700, MAE 5710, or A+ level understanding of any sophomore or above mechanics course. Next offered 2009–2010. The energetics and stability of people, other legged animals and robots are studied by mechanical analysis of simple models.

**Special Courses, Projects, and Thesis Research**

**TAM 4130 Introduction to Nuclear Science and Engineering (also AEP/CHEME/ECE/NSE 4130; MAE 4580)** Fall. 3 credits. K. B. Gady. For seniors and M.Eng. students interested in nuclear energy. Topics are presented at the level of the course text: Larmor 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 4910-4920 Project in Engineering Science** 491, fall; 492, 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. 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. 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.
Allbonesi, David H., Ph.D., U. of Massachusetts. Assoc. Prof., Electrical and Computer Engineering.
Allbright, Louis D., Ph.D., Cornell U. Prof., Biological and Environmental Engineering.
Allmendinger, Richard, Ph.D., Stanford U. Prof., Earth and Atmospheric Sciences.
Allmon, Louis, Ph.D., California Inst. of Technology. Assoc. Prof., Chemical and Biomolecular Engineering.
Apsel, Alyssa B., Ph.D., Johns Hopkins U. Clare Boothe Luce Assoc. Professor of Electrical and Computer Engineering.
Aucher, Lynden A., Ph.D., Stanford U. Marjorie J. Hart ’50 Professor of Engineering.
Chemical and Biomedical Engineering.
Arnold, Dieter G., Ph.D., Cornell U. Prof., Materials Science and Engineering.
Avis, Thomas, Ph.D., Princeton U. Prof., Mechanical and Aerospace Engineering.
Baezner, Aline J., Ph.D., U. of Stuttgart (Germany). Assoc. Prof., Biological and Environmental 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.
Barsh, 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.
Birman, Kenneth P., Ph.D., U. of California, Berkeley. Prof., Computer Science.
Bisogni, James J., Ph.D., Cornell U. Assoc. Prof., Civil and Environmental Engineering.
Blackey, John M., Ph.D., Glasgow U. (U.K.). Herbert Fisk Johnson Professor of
Hogg, Nelson, Ph.D., Massachusetts Inst. of Technology. Adjunct Prof., Earth and Atmospheric Sciences
Hopcroft, John E., Ph.D., Stanford U., IBM Professor of Engineering and Applied Mathematics, Computer Science
Hower, Kenneth C., Ph.D., Cornell U. Prof., Civil and Environmental Engineering
Hui, Chung Y., Ph.D., Harvard U. Prof., Theoretical and Applied Mechanics; Mechanical and Aerospace Engineering
Hunter, Jean B., Ph.D., Columbia U. Assoc. Prof., Biological and Environmental Engineering
Huttenlocher, Daniel, Ph.D., Massachusetts Inst. of Technology. Prof., Computer Science/Johnson Graduate School of Management
Hysell, David L., Ph.D., Cornell U. Prof., Earth and Atmospheric Sciences
Ingersoll, Scoby R., Ph.D., U. of Colorado. Dwight C. Baum Prof. in Engineering, Civil and Environmental Engineering
Irwin, Lynne H., Ph.D., Texas A&M U. Assoc. Prof., Biological and Environmental Engineering
Isacks, Bryan L., Ph.D., Cornell U. William J. Irwin, Lynne H., Ph.D., Texas A&M U. Assoc. Prof., Biological and Environmental Engineering
Jackson, Peter L., Ph.D., Stanford U. Prof., Operations Research and Information Engineering
James, Doug L., Ph.D., U. of British Columbia (Canada). Assoc. Prof., Computer Science
Jaroff, Robert A., Ph.D., Massachusetts Inst. of Technology. Prof., Operations Research and Information Engineering
Jenkins, James T., Ph.D., Johns Hopkins U. Walter S. Carpenter, Jr, Professor of Engineering, Theoretical and Applied Mechanics
Jewell, William J., Ph.D., Stanford U. Prof. (Emeritus), Biological and Environmental Engineering
Jin, Monsoo, Sc. D., Massachusetts Inst. of Technology. Asst. Prof., Biomedical Engineering
Joachims, Thorsten, Ph.D., U. of Dortmund (Germany). Assoc. Prof., Computer Science
Johns, Robert C., Ph.D., Stanford U. Prof., Electrical and Computer Engineering
Joo, Yong Lek, Ph.D., Stanford U. Asst. Prof., Chemical and Biomolecular Engineering
Jordan, Teresa, Ph.D., Stanford U. Prof., Earth and Atmospheric Sciences
Kan, Edwin C., Ph.D., U. of Illinois, Champaign-Urbana. Assoc. Prof., Electrical and Computer Engineering
Karig, Daniel E., Ph.D., U. of California (S.I.O.). Prof. (Emeritus), Earth and Atmospheric Sciences
Kay, Robert W., Ph.D., Columbia U. Prof., Earth and Atmospheric Sciences
Kay, Suzanne M., Ph.D., Brown U. Prof., Earth and Atmospheric Sciences
Keich, Uri, Ph.D., Courant Inst. Asst. Prof., Computer Science
Kelley, Michael C., Ph.D., U. of California, Berkeley. James A. Friend family Distinguished Prof., Electrical and Computer Engineering
Kintner, Paul M., Ph.D., U. of Minnesota. Prof., Electrical and Computer Engineering
Kirby, Brian L., Ph.D., Stanford U. Asst. Prof., Mechanical and Aerospace Engineering
Kleinberg, Jon M., Ph.D., Massachusetts Inst. of Technology. Prof., Computer Science
Kleinberg, Robert, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Computer Science
Kline, Ronald R., Ph.D., U. of Wisconsin. Prof., Electrical and Computer Engineering (History of Technology)
Knapp, Warren W., Ph.D., U. of Wisconsin. Prof. (Emeritus), Earth and Atmospheric Sciences
Koch, Christoph, Ph.D., T. U. Vienna (Austria). Assoc. Prof., Computer Science
Koch, Donald L., Ph.D., Massachusetts Inst. of Technology. Prof., Chemical and Biomolecular Engineering
Kostroun, Vlachy O., Ph.D., U. of Oregon. Assoc. Prof., Applied and Environmental Physics
Koutsourakis, Phaedon-Stelias, Ph.D., Princeton U. Asst. Prof., Civil and Environmental Engineering
Kozhen, Dexter, Ph.D., Cornell U. Joseph Newton Pew, Jr. Professor in Engineering, Computer Science
Kühnle, Patrick D., Ph.D., U. of California, Berkeley. Prof., Civil and Environmental Engineering
Kusse, Bruce R., Ph.D., Massachusetts Inst. of Technology. Prof., Applied and Environmental Engineering
Lal, Amit, Ph.D., U. of California, Berkeley. Assoc. Prof., Electrical and Computer Engineering
Lance, R. H., Ph.D., Brown U. Prof. (Emeritus), Theoretical and Applied Mechanics
Lee, Lillian, Ph.D., Harvard U. Assoc. Prof., Computer Science
Leibovich, Sidney, Ph.D., Cornell U. Samuel B. Eckert Prof. of Mechanical and Aerospace Engineering
Lewis, Adrian Ph., Ph.D., Cambridge U. (U.K.). Prof., Operations Research and Information Engineering
Lewis, Mark D., Ph.D., Georgia Inst. of Technology. Assoc. Prof., Operations Research and Information Engineering
Liddell, Chekesha, Ph.D., Georgia Inst. of Technology. Asst. Prof., Materials Science and Engineering
Lindau, Manfred, Ph.D., Technical U. Berlin (Germany). Assoc. Prof., Applied and Engineering Physics
Lion, Leonard W., Ph.D., Stanford U. Prof., Civil and Environmental Engineering
Lipson, Hod, Ph.D., Technion Israel Inst. of Technology. Assoc. Prof., Mechanical and Aerospace Engineering
Lipson, Michal, Ph.D., Technion Israel Inst. of Technology. Assoc. Prof., Electrical and Computer Engineering
Li, Philip L.-F., Sc.D., Massachusetts Inst. of Technology. Prof., Civil and Environmental Engineering
Lohman, Rowena B., Ph.D., California Inst. of Technology. Asst. Prof., Earth and Atmospheric Sciences
Malliaras, George G., Ph.D., Rijksuniversiteit Groningen (Greece). Assoc. Prof., Materials Science and Engineering
March, John C., Ph.D., U. of Maryland. Asst. Prof., Biological and Environmental Engineering
Marschner, Steve, Ph.D., Cornell U. Asst. Prof., Computer Science
Martínez, José F., Ph.D., U. of Illinois, Urbana-Champaign. Assoc. Prof., Electrical and Computer Engineering
Miwara, John, Ph.D., Cornell U. Sr. Research Assoc., Earth and Environmental Engineering
McGuire, Stephen C., Ph.D., Cornell U. Assoc. Prof., Engineering
McKee, Sally A., Ph.D., U. of Virginia. Asst. Prof., Electrical and Computer Engineering
McNelley, Linda K., Ph.D., U. of Pennsylvania. Prof., Civil and Environmental Engineering
Müller, John A., Ph.D., U. of Michigan. Achenbroeck Lab Prof., Operations Research and Information Engineering
Mukherjee, Subhrata, Ph.D., Stanford U. Prof., Theoretical and Applied Mechanics; Mechanical and Aerospace Engineering
Muller, David Ph., Cornell U. Assoc. Prof., Applied and Engineering Physics
Myers, Andrew, Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Computer Science
Novick, Linda K., Ph.D., U. of Pennsylvania. Prof., Civil and Environmental Engineering
Ober, Christopher K., Ph.D., U. of Massachusetts. Francis Norwood Bard Professor, Materials Science and Engineering
Olive, William L., Ph.D., California Inst. of Technology. Prof., Chemical and Biomolecular Engineering
Oliver, Jack, Ph.D., Columbia U. Prof. (Emeritus), Earth and Atmospheric Sciences
O’Rourke, Thomas D., Ph.D., U. of Illinois. Thomas R. Briggs Professor of Engineering, Civil and Environmental Engineering
Parflange, Jean-Yves, Ph.D., Brown U., Biological and Environmental Engineering
Pass, Rafael Ph., Massachusetts Inst. of Technology. Asst. Prof., Computer Science
Peck, Mason A., Ph.D., U. of California, Los Angeles. Asst. Prof., Mechanical and Aerospace Engineering
Pekoz, Teoman, Ph.D., Cornell U. Prof. (Emeritus), Civil and Environmental Engineering
Phelan, Richard, M.M.E., Cornell U. Prof. (Emeritus), Mechanical and Aerospace Engineering
Philpot, William D., Ph.D., U. of Delaware. Assoc. Prof., Civil and Environmental Engineering
Phipps Morgan, John, Ph.D., Brown U. Prof., Theoretical and Applied Mechanics; Mechanical and Aerospace Engineering
Phoenix, S. Leigh, Ph.D., Cornell U. Prof., Operations Research and Information Engineering
White, Richard N., Ph.D., U. of Wisconsin. Prof. (Emeritus), Civil and Environmental Engineering

White, William M., Ph.D., U. of Rhode Island. Prof., Earth and Atmospheric Sciences

Wickham, Lisa, Ph.D., Cornell U. Instructor, Applied and Engineering Physics

Wicker, Stephen B., Ph.D., U. of Southern California. Prof., Electrical and Computer Engineering

Wiesner, Ulrich B., Ph.D., U. of Mainz (Germany). Prof., Materials Science and Engineering

Wilks, Daniel S., Ph.D., Oregon State U. Prof., Earth and Atmospheric Sciences


Williamson, David P., Ph.D., Massachusetts Inst. of Technology. Prof., Operations Research and Information Engineering

Wise, Frank W., Ph.D., Cornell U. Prof., Applied and Engineering Physics

Woodard, Dawn B., Ph.D., Duke University. Asst. Prof., Operations Research and Information Engineering

Wysocki, Mark S., M.S., Cornell U. Sr. Lec., Earth and Atmospheric Sciences

Xu, Chris, Ph.D., Cornell U. Assoc. Prof., Applied and Engineering Physics

Zabaras, Nicholas, Ph.D., Cornell U. Prof., Mechanical and Aerospace Engineering

Zabih, Ramin, Ph.D., Stanford U. Prof., Computer Science

Zehnder, Alan, Ph.D., California Inst. of Technology. Prof., Theoretical and Applied Mechanics; Mechanical and Aerospace Engineering

Zhang, Ke Max, Ph.D., U. of California. Asst. Prof., Mechanical and Aerospace Engineering

Zipfel, Warren, Ph.D., Cornell U. Assoc. Prof., Biomedical Engineering
ADMINISTRATION
Alison G. Power, dean
J. Ellen Gainor, associate dean
Terry D. Plater, associate dean
Sarah S. Hale, associate dean
Brenda Wickes, assistant dean

Students interested in professional and research master's and doctoral degrees at Cornell pursue their graduate studies through the Graduate School, which administers 96 graduate fields, ranging from aerospace engineering to zoology. Programs leading to degrees in law (J.D. and LL.M.) are administered by the Cornell Law School; the doctor of medicine (M.D.) is administered by Cornell's Weill Medical College in New York City; the doctor of veterinary medicine (D.V.M.) is administered by the College of Veterinary Medicine; and the master of business administration (M.B.A.) is earned through the Johnson Graduate School of Management.

THE GRADUATE SCHOOL
The graduate program at Cornell permits an unusual degree of accommodation to the needs and interests of the individual student. Degree requirements are kept to a minimum. There are no specific course or credit requirements for the advanced general degrees of master of arts, master of science, and doctor of philosophy but only such general requirements as best accomplish the aim of graduate study: a period of study in residence, mastery of one subject, adequate knowledge of allied subjects, oral examinations to establish competency for presentation of a dissertation or thesis, and a satisfactory dissertation or thesis. Certain advanced professional degree programs have specific course or credit requirements that are determined by the faculty of the professional school or college in which the degrees are offered. All students must have course enrollment each semester. Students not enrolling in specific courses must enroll for thesis or dissertation research using either Graduate School or, if available, departmental course numbers assigned for that purpose.

A close working relationship between the student and faculty members is essential to the graduate program at Cornell. Under the Special Committee system, the student is guided by, and works with, at least two or three faculty members chosen by the student to represent his or her major and minor subjects. The major subject representative is the chair of the Special Committee, who usually has the primary responsibility for directing the student's thesis or dissertation research.

REQUIREMENTS FOR ADMISSION
A successful applicant to the Graduate School must:
1. hold a baccalaureate degree or its equivalent granted by a faculty or university of recognized standing;
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.
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.

DEADLINES
Each graduate field of study has specific deadlines for fall and spring admission. The earliest deadline is December 1; many deadlines fall in mid-January. Applications should be received no later than those published dates, which are available online at catalog.gradschool.cornell.edu.

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
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
Judi Brownell, dean of students
David Sherwyn, academic director, Center for Hospitality Research
Joe Strodel, director of corporate relations
Tom Ward, director of the Leland C. and Mary M. Pillsbury Institute for Hospitality Entrepreneurship
Richard Pender, Richard J. and Monene P. Bradley Director for Graduate Studies
Lisa M. Shaffer, director of alumni affairs and development
Meg Keilbach, interim director of alumni management
Molly deRoos, associate director of career management
Dina Kristof, registrar

DEGREE PROGRAMS

<table>
<thead>
<tr>
<th>Degree Program</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel Administration</td>
<td>B.S.</td>
</tr>
<tr>
<td></td>
<td>M.M.H.</td>
</tr>
<tr>
<td></td>
<td>M.S.</td>
</tr>
<tr>
<td></td>
<td>Ph.D.</td>
</tr>
</tbody>
</table>

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 1240 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 60 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 awarded 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.

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 4970, 4980, 4990, 6980, or 6990 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 in its programs 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 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.

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.) in Culinary Arts or Baking and Pastry 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 2256 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. Frequent questions are available at www.hotschool.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 incom-
plete grades are honored by being placed on
the Dean's List.

**Course Requirements for the Bachelor of Science Degree**

**Required courses**

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations: HADM 1105, 1106, 2201, 3301, 3305</td>
<td>14</td>
</tr>
<tr>
<td>Management and Organizational Behavior: HADM 1115</td>
<td>3</td>
</tr>
<tr>
<td>Human Resource Management: HADM 2211</td>
<td>3</td>
</tr>
<tr>
<td>Finance/Accounting: HADM 1121, 2221, 2222, 3321</td>
<td>12</td>
</tr>
<tr>
<td>Food and Beverage Management: HADM 2236</td>
<td>4</td>
</tr>
<tr>
<td>Marketing, Tourism, and Strategy: HADM 2243, 4441</td>
<td>6</td>
</tr>
<tr>
<td>Facilities Management, Planning, and Design: HADM 2255, 3355</td>
<td>6</td>
</tr>
<tr>
<td>Managerial Communication: HADM 1105, 3365, first-year writing seminar</td>
<td>9</td>
</tr>
<tr>
<td>Information Systems: HADM 1174, 2275</td>
<td>6</td>
</tr>
<tr>
<td>Law: HADM 3387</td>
<td>3</td>
</tr>
<tr>
<td>Economics: HADM 1141</td>
<td>3</td>
</tr>
</tbody>
</table>

**Specifically required credits**

- Hotel electives: 12
- Distributive electives: 18
- Free electives: 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 upperclass years.

**Freshman Year**

Typically, a freshman schedule will consist of 15 to 16 credits each semester, to include the following:

<table>
<thead>
<tr>
<th>Required courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HADM 1105 Introduction to Hotel Operations</td>
<td>2</td>
</tr>
<tr>
<td>HADM 1106 Introduction to Food Service Operations</td>
<td>2</td>
</tr>
<tr>
<td>HADM 1115 Organizational Behavior and Interpersonal Skills</td>
<td>3</td>
</tr>
<tr>
<td>HADM 1121 Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>HADM 1141 Microeconomics for the Service Industries</td>
<td>3</td>
</tr>
<tr>
<td>HADM 1165 Managerial Communication I</td>
<td>3</td>
</tr>
<tr>
<td>HADM 1174 Microcomputing</td>
<td>3</td>
</tr>
<tr>
<td>First-year writing seminar</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Required courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HADM 2201 Hospitality Quantitative Analysis</td>
<td>3</td>
</tr>
<tr>
<td>HADM 2211 Human Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>HADM 2221 Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>HADM 2222 Finance</td>
<td>3</td>
</tr>
<tr>
<td>HADM 2236 Culinary Theory and Practice</td>
<td>4</td>
</tr>
<tr>
<td>HADM 2243 Principles of Marketing</td>
<td>3</td>
</tr>
<tr>
<td>HADM 2255 Hotel Development and Planning</td>
<td>3</td>
</tr>
<tr>
<td>HADM 2275 Introduction to Information Systems Management</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Required courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HADM 3301 Service Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>HADM 3305 Restaurant Management</td>
<td>4</td>
</tr>
<tr>
<td>HADM 3321 Hospitality Financial Operations</td>
<td>3</td>
</tr>
<tr>
<td>HADM 3355 Hospitality Facilities Operations</td>
<td>3</td>
</tr>
<tr>
<td>HADM 3365 Managerial Communication II</td>
<td>3</td>
</tr>
<tr>
<td>HADM 3387 Business and Hospitality Law</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>12</td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Required courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HADM 4441 Strategic Management</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>27</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Required courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HADM 6610 Dean's Distinguished Lecture Series</td>
<td>1</td>
</tr>
<tr>
<td>HADM 7703 Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>HADM 7711 Organizational Behavior Management</td>
<td>3</td>
</tr>
<tr>
<td>HADM 7712 Human Resources Management</td>
<td>3</td>
</tr>
<tr>
<td>HADM 7723 Corporate Finance</td>
<td>3</td>
</tr>
<tr>
<td>HADM 7724 Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>HADM 7743 Hospitality Marketing</td>
<td>3</td>
</tr>
<tr>
<td>HADM 7440 Competitive Strategies for the Hospitality Industry</td>
<td>3</td>
</tr>
</tbody>
</table>

HADM 7751 Property Development and Planning | 3       |
HADM 7761 Managerial Communication | 3       |
HADM 7720 Information Systems Management | 3       |
HADM 7790 Internship | 1       |
HADM 7791 Professional Development | 0.5     |
HADM 7792 Professional Development | 0.5     |
HADM 7795 Master Class | 1       |
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**

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.

**Management and Organizational Behavior**

HADM 1110 **Distinguished Lectures in Hospitality Management**

Fall. 1 credit. Elective. Those wishing to enroll have until Friday, Sept. 5, 2008, 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, Statler Hotel management, and industry executives, 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 4110 Negotiations in the Hospitality Industry
Spring. 3 credits. Elective. Limited to 30 students. Prerequisite: undergraduate standing; HADM 1115 or equivalent. Grad students register as 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 4410 Hospitality Management Seminar
Fall. 1 credit. Elective. Limited to 30 Hotel seniors and graduate students. Corequisite: HADM 1110. Preregistered students or students wishing to add course who do not attend first class and who fail to notify secretary to Back 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, 2008, 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 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. 6, F., Feb. 13 (1–8 P.M.), S., Feb. 14 (10 A.M.–6 P.M.), Sun., Feb. 15 (10 A.M.–4:30 P.M.). 2009, in Statler Auditorium. Attendance mandatory for credit. Fee for required notebook (charged to student’s bursar bill; notebook distributed on first day of class): $35. 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 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. 2nd 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 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-level course that provides a unique opportunity for successful industry leaders to share their experiences with MMH 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 unrelated 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 covers 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
Spring. 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 60 students perlec. 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 enhance 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
Fall. spring. 3 credits. Elective. 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
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 20 students. Prerequisite: HADM 1165 or ILR 260. May not be taken by graduate students.

HADM 3365 Managerial Communication II
Fall, spring. 3 credits. Required. Limited to 22 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.

HADM 4462 Intercultural Communication in the Hospitality Industry
Spring. 3 credits. Elective. Priority given to Hotel students. D. Lennox.

HADM 4467 Business and Hospitality Law
Fall, spring. 3 credits. Elective. Prerequisite: junior, senior, or graduate standing; HADM 3387 or permission of instructor. D. Sherwyn.

HADM 4487 Real Estate Law
Fall, spring. 3 credits. Elective. Prerequisite: junior, senior, or graduate standing. Recommended: completion of HADM 3387. A. Klauser.

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 personal life.
HOSPITALITY FACILITIES AND OPERATIONS

Food and Beverage Management

HADM 2236 Culinary Theory and Practice
Fall, spring. 4 credits. Required. Prerequisite: HADM 1100. 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. T. O’Connor and 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 waiting list. 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 on hands-on and practical 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 24 hours 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. 12, 2008, and drop deadline in spring is F, Jan. 30, 2009. Fee (includes cost of wines 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 School juniors, seniors, and graduate students. 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 developments 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. Next offered 2009–2010.

HADM 4435 Selection, Procurement, and Supply Management
Fall, 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, 2008. 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 supply is 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).

Faculty.

This course is designed for 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 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 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 4440 Exploring Social Responsibility: Hunger and Homelessness
Spring. 3 or 4 credits, variable. Elective. T. O’Connor.

This is a service-learning course that explores public and private sector approaches to addressing hunger, poverty, and homelessness. Through lectures, class discussions, research, community service work, and a field placement practicum, students will explore the economic, social, and political issues of our country’s concern with housing and feeding disenfranchised and homeless people. Students will study the history of poverty and
homelessness and the strategies to prevent or alleviate the problem through public policy, housing programs, food assistance programs, and job training initiatives.

This is a service learning course centered on community work experience. Students must choose one of the following options:

A. Four-credit option whereby students work in pairs or small groups with a local area agency that provides services for homeless or disadvantaged people. They will analyze the agency’s mission and goals, identify managerial challenges, and formulate an approach in the form of project or service that is useful to the agency. This field practicum will comprise approximately 60 hours of work during this semester, half of which will be in direct contact with the agency and its clients.

B. Four-credit option whereby students will participate in an ALTERNATIVE SPRING BREAK in an agency(ies) in Washington, D.C., or New York City. Students will work five full days in an agency that serves homeless, hungry, or disenfranchised people, such as homeless shelters, community kitchens, or domestic violence shelters. Housing and transportation are arranged through the Public Service Center. This option may cost students up to $150. Students interested in this option must see the instructor at pre-registration time.

C. Three-credit option whereby students do community work in the Ithaca area with an agency that serves homeless, hungry, or disenfranchised people. Students will work on a regular weekly basis for a minimum of 30 hours during this semester.

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 Case Studies in 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 additional 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 its supporting industries. You will be responsible for coming up with a business plan and operating a 250-room simulated CHESS 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 they serve. Students gain an understanding of how work is performed and how activities are coordinated within the rooms division and among other hotel departments.

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. J. LeBel.

Students are introduced to the principles of food service operations, beginning with an overview of the food analysis 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 60 Hotel students per lecture. C. Anderson 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 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 students. Senior members are not eligible. Open enrollment in spring. 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. 5, 2008, and in spring is Jan. 30, 2009. 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.
T. O'Connor.

The course focuses on outsourcing food service 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 food service operations rather than just restaurants and hotels. They also explore operational parameters for different types of food service 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 dependent 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. Drop deadline for course is end of week three. Cost of required field trip to Atlantic City: approximately $250. 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 unique challenges facing casino hotel operators.

**HADM 4414 Quality Systems and Processes**
Spring. 3 credits. Elective. A. Verma.

The foundation of this course is on the emergence of quality management as a strategic focus in seeking excellence and a competitive edge. We will cover the underlying theory and conceptual basis behind quality management approaches commonly known as Six-Sigma, TQM, etc., which are frequently utilized by service firms operating in different competitive environments. Topics covered include: defining quality in service industries; techniques for designing service processes; process analysis; problem identification techniques; statistical process control techniques; process capability analysis; and robust design of service processes. Case studies illustrate the issues related to the implementation of successful quality management programs.

**HADM 4495 Implementing Strategies for Tying Wellness Practices to Company Profit**
Spring. 3 credits. Elective. Priority given to juniors, seniors, and graduate students; others may enroll, space permitting. Facilities.

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 can sharpen 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 officials are 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 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: 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 6602 Spa and Spa Hotel and Resort Development and Management**
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 explores the development, management, and marketing of free-standing spas, spas in hotels and resorts, and spa...
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 are 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**

Spring. 3 credits. M.M.H. requirement. Prerequisite: M.M.H. students or permission of instructor. S. Kimes. 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 restaurants. Course components include: the project development sequence; conceptual and space planning; architectural design criteria; construction management; and the interpretation of architectural drawings 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 Management**

Fall. Spring. 3 credits. Required. 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 4453 Foodservice Facilities Design**

Spring. 3 credits. Elective. Required. Not open to undergraduates: HADM 3305. Students who wish to develop design skills for restaurant concepts are encouraged to enroll in HADM 4453 in the following spring. 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. Specific topics include concept creation, market research, creation of the delivery process, concept testing and evaluation, restaurant feasibility site selection, facility programming, and development issues such as licensing, permitting, and construction. Visitors from the industry address best practices and their own experiences in getting a restaurant concept off the ground. The course includes readings, discussions with industry leaders, and culminates with students formulating a detailed restaurant concept and development plan.

**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. Faculty. Next offered 2009–2010.

---

**HADM 3355 Hospitality Facilities Management**

Fall, spring. 3 credits. Required. Prerequisite: HADM 2255. D. Zemke.

This program 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 design development skills for restaurant concepts are encouraged to enroll in HADM 4451 in the following spring. 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. Specific topics include concept creation, market research, creation of the delivery process, concept testing and evaluation, restaurant feasibility site selection, facility programming, and development issues such as licensing, permitting, and construction. Visitors from the industry address best practices and their own experiences in getting a restaurant concept off the ground. The course includes readings, discussions with industry leaders, and culminates with students formulating a detailed restaurant concept and development plan.
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 introduces 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.

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 mid-point of course. Graduate students should enroll in HADM 6640. Faculty. 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 3342 Marketing Research for Decision Makers  
Spring. 3 credits. Elective. Prerequisite: HADM 2243 and a statistics course. M. Lynn. 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 3343 Marketing Research for Decision Makers  
Spring. 3 credits. Elective. Prerequisite: HADM 2243 and a statistics course. M. Lynn. 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 4441 Strategic Management  
Fall. 3 credits. Required. Prerequisites: senior standing; at least one introductory marketing course. Grad students should enroll in HADM 6640. Faculty. Prepare to test your strategic and tactical ideas in a highly challenging yet low-risk classroom setting.

HADM 4442 Strategic Marketing  
Fall. 3 credits. Elective. Limited to Hotel students. Prerequisite: marketing course. C. Hart. The increasingly complex global business environment requires you to think strategically to make smarter business decisions. This course will offer innovative, practical, and profitable insights to improve revenue, profit, and customer loyalty. You will learn concepts underlying strategic marketing, study leading examples, and analyze strategic marketing challenges and opportunities facing hospitality companies. The unique benefits of this course come from taking a global perspective on the hospitality industry, the use of detailed cases in which students break into competing teams to formulate strategies and tactics in a realistic setting, and learning best practices from some of the world’s leading strategic marketers. Prepare to test your strategic and tactical ideas in a highly challenging yet low-risk classroom setting.

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 hands-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. 2 credits. Elective. Prerequisite: Hotel students who have completed sophomore core courses. J. Quest. The course will introduce students to the process of starting a business from the group up, and to the qualities that are associated with successful entrepreneurs. Because the business plan is the heart of the startup process, the course will concentrate on the construction of business plans for new business concepts. The course will focus on the basic tasks associated with the initial stages of starting a new venture: (1) how to identify and validate a new business opportunity; and (2) how to organize, construct, and write a sound, clear, concise business plan that is a selling document. The class will be exposed to recent trends in the hospitality industry and will select a few concepts identified by the instructor as startup business ideas. There will be analyses of actual business plans that were able to raise capital, as well as a review of real-life examples of the process of raising money, furnished by the instructor and other sources. The subject matter will be energized with the natural enthusiasm that comes from the day-to-day experiences of starting your own business.
This course provides a framework for understanding the complexity and the methods used by industry experts to acquaint the student with the challenge of packaging. Readings, lectures, discussions, and industry guest-speakers. A main focus of the course is a team consulting project involving a services-marketing audit of a “live” organization. This ‘Stage II’ business plan will include a projection for capital needed for startup. The class will become acquainted with some of the resources for raising capital, as well as recognizing the competition for funding. These resources will include, but not be limited to, personal debt, government assistance, commercial banks, strategic partnerships, and equity financing. All teams will present their final plan to professionals and venture capitalist sources at the close of the course.

HADM 4446 Hospitality Pricing and Analysis
Spring, 2 credits. Prerequisite: HADM 1141 and HADM 2243, others by permission. 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, lecturers, 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, 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 channels; managing hospitality distribution strategies; and the role of convention and visitors bureaus, national tourist organizations, and associations in distribution management.

HADM 4449 Integrated Marketing Communications
Spring, 3 credits. Non-Hotel students must have permission to enroll. Graduate students should enroll in HADM 6649. Faculty
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 6640 Franchising in the Hospitality Industry
Spring, second seven weeks of semester, 2 credits. Elective. Note: deadline to drop course is mid-point of course. Undergrad students should enroll in HADM 3340. Faculty.
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 will also be guest speakers from the franchising industry.

HADM 6645 Services Marketing and Customer Experience Management
Fall, 3 credits. Elective. Prerequisite: graduate standing; marketing course or permission of instructor. R. Kwock.
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 service escarpment); and integrated marketing communication strategies for services. Students learn through discussion of current services theories and research, experiential exercises, case analyses, and teamwork with industry experts. A main focus of the course is a team consulting project involving a services-marketing audit of a “live” organization.

HADM 6647 Consumer Behavior
Spring, 3 credits. Elective. Limited to 25 graduate students. Undergraduate students should enroll in HADM 3347. 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 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 6648 Competing on Customer Experiences
Fall. 3 credits. Elective. Prerequisite: introductory marketing course. C. Hart.
Companies’ ability to win in the marketplace is dependent on the quality of their customers’ experiences. Customer Experience Management (CEM) is an emerging field that draws on concepts and tools from operations, marketing, human-resource management, and IT. In this course, students will learn, through readings, case studies, and interactive discussions, the fundamentals of CEM, how to apply them in different business settings, and how leading companies are using CEM to build their competitive strength and financial performance.

HADM 6649 Integrated Marketing Communications
Spring, 3 credits. Non-Hotel students must have permission to enroll. Undergraduate students should enroll in HADM 4449. 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 7440 Competitive Strategies for the Hospitality Industry
Spring. 3 credits. M.M.H. requirement. Prerequisite: M.M.H. students or permission of instructor. M. Kualimin.
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 the industry 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.

**HADM 7743 Marketing Management for Services**
Summer. 3 credits. M.M.H. requirement.
Prerequisite: M.M.H. students or permission of instructor. C. Dev.
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, promotion, and distribution policies. The capstone of the course is team development of a marketing plan for a new hospitality business.

**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 sec. P. Clark.
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 and faculty.
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 sec. 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.
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 7720 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 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 ratio is introduced and interpreted.

**HADM 2221 Managerial Accounting**
Fall, spring. 3 credits. Required.
Prerequisites: Hotel undergraduates; HADM 1121 or equivalent. G. Potter and J. Herford.
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. Faculty.
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.
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 content is 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 4427 Multinational Finance and International Risk Management
Spring. 3 credits. Prerequisites: Introduction to Corporate Finance and Financial Accounting or permission of instructor. Graduate students should enroll in HADM 6627. Faculty.

This is a case-based course that investigates issues that arise when businesses are run or investments are made in an international setting. It discusses currency risk and exchange rate determination, examines currency risk from both transactional and translation perspectives, and discusses the currency derivative market and hedging strategies. In addition, the course provides a critical exploration of country risk and the state of and differences between capital markets around the world. Students will gain hands-on experience in the subtle but substantial complexities that arise when doing business and investing outside of a single, well-developed economy.

HADM 4428 Investment Analysis and Portfolio Management
Fall, spring. 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 6628. 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 from 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, the underlying concepts for income measurement, and the accounting rules for the valuation 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 the impact of alternate treatment of published financial information, specifically in the context of valuation, debt and compensation contracts, and credit assessment.

HADM 6625 Securitization and Structured Financial Products
Spring. 3 credits. Elective. Prerequisites: junior or senior standing; HADM 3321. 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 2222 or 721. D. Quan.

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 6627 Multinational Finance and International Risk Management
Spring. 3 credits. Elective. Prerequisites: Introduction to Corporate Finance and Financial Accounting, or permission of instructor. Undergraduates should enroll in HADM 4427. Faculty.

For description, see HADM 4427.

HADM 6628 Investment Analysis and Portfolio Management
Fall, spring. 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 4428. C. Chang.

For description, see HADM 4428.

HADM 6629 Investment Analysis and Portfolio Management
Fall, spring. 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. Graduate students must enroll in HADM 6620. P. Liu.
This survey course approaches real estate from four perspectives: investment, market, mortgage finance, and legal. Understanding these perspectives enables students to make better financing, development, and investment decisions; to use real estate resources wisely; to understand public policy issues; and to be prepared for additional courses in real estate investment, finance, and development.

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. Presentation of hospitality industry real estate practitioners will tie course material to current industry practices.

HADM 4428 Real Estate Finance and Investments
Fall, spring. 3 credits. Elective. Limited to Program of Real Estate and Hotel undergrad students; others by permission of instructor. 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 4429 Hotel Ezra Cornell (H.E.C.)
Fall and spring. Variable credits: 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 2–5, 2009. 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 4491 Management Intern Program I—Operations
Fall, spring. 6 credits. Elective. Prerequisites: Hotel freshman and sophomore core courses. Highly recommended: HADM 3521, 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 field. Six performance evaluations are used to determine this grade. Students must be in good academic standing and have a GPA of at least 2.0 in the preceding semester. Further information is available in the Office of Student Services, 180 Statler Hall.
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 6677; FREN 6700)]
Spring. 4 credits. Next offered 2009–2010. D. Rubenstein and L. Shaffer. Beginning with an examination of hospitality in authors such as Foucault and Levinas and other text such as the Bible, we focus on Derrida’s writings on hospitality from the 1990s until his death.

HADM 6698 Graduate Independent Research
Fall, spring. Elective. Faculty. 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. Faculty. 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 7790 Externship
Winter. 1 credit. M.M.H. requirement. Prerequisite: M.M.H. students or permission of instructor. Faculty. The overall goals for the externship are: to model for the students’ activities and behaviors that are critical for their future success in a business environment and to require the students to articulate new understandings and develop an action plan that will allow them to get ahead.

HADM 7791 Professional Development I
Summer. 0.5 credits. M.M.H. requirement. Prerequisite: M.M.H. students or permission of instructor. Faculty. Seminar format, varies week to week.

HADM 7792 Professional Development II
Fall. 0.5 credits. M.M.H. requirement. Prerequisite: M.M.H. students or permission of instructor. Faculty. Seminar format, varies week to week.

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.
Johnson, Michael D., Ph.D., U. of Chicago.  
Dean and E. M. Statler Professor.  
Kalnins, Arturs, Ph.D., U. of Michigan. Assoc. Prof.  
Kimes, Sheryl E., Ph.D., U. of Texas.  
Singapore Tourism Board Distinguished Professor in Asian Hospitality Management  
Kwortnik, Robert, Ph.D., Temple U. Asst. Prof.  
LeBel, Jordan, Ph.D., McGill U. Assoc. Prof.  
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. Assoc. Prof.  
Ma, Qingzhong, Ph.D., U. of Southern California. Asst. Prof.  
Mutkoski, Stephen A., Ph.D., Cornell U. Banfi Vintners Professor of Wine Education and Management  
Norkus, Greg, M.S., Cornell U., Sr. Lec.  
O’Connor, Therese A., M.S., Elmira Coll. Sr. Lec.  
Penner, Richard H., M.S., Cornell U. Prof., Richard J. and Monene P. Bradley Director of Graduate Studies  
Quan, Daniel W. C., Ph.D., U. of California, Berkeley. Prof.  
Renaghan, Leo M., Ph.D., Pennsylvania State U. Assoc. Prof.  
Robson, Stephani, M.S., Cornell U. Sr. Lec.  
Shewry, David, J.D., Cornell U. Assoc. Prof., Academic Director, Center for Hospitality Research  
Siguaw, Judy, D.B.A., Louisiana Technical U. Prof., Dean, Cornell Nanyang Institute  
Simons, Tony L., Ph.D., Northwestern U. Assoc. Prof.  
Snow, Craig, Ph.D., Purdue U. 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. Lec.  
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.  
Wagner, Erica, Ph.D., London School of Economics and Political Science. Asst. Prof.  
Walsh, Kate, Ph.D., Boston Coll. Asst. Prof.  
Way, Sean, Ph.D., State U. of New Jersey. Asst. Prof.  
White, Robert, A.O.S., Culinary Inst. of America. Teaching Support Specialist  
Zemke, Dina, Ph.D., University of Nevada, Las Vegas. Asst. Prof.
DEGREE PROGRAMS
Cornell programs in Human Ecology 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
- Individual curriculum
- 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 (172 MVR) can provide information of interest to mature students. Mature students are permitted to enroll for as few as 6 credits without petitioning for permission 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 the 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, 255-4887). 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 student's faculty advisor 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-051) 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, 255-2255) 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 Admission, 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 training 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 and their physical surroundings. The program seeks to expand understanding of how 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. The effect of human capabilities or characteristics such as family structure, lifestyle, social class, and stage-in-life cycle on environmental needs and requirements is also a focus of the program. Career opportunities are available in 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 must approve 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 Nancy Breen, 205 MVR. 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 an 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 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, athletic, 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 (HBHHS) 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. HBHHS 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

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. A wide range of issues are included in the study of human development, including biological, cognitive, and emotional development; the role of family, neighborhood, workplace, and culture in development; and the influence that developing humans have on their environment. The human development major provides an excellent foundation for many careers, such as medicine (particularly family medicine, pediatrics, and psychiatry), clinical psychology and other mental health professions, law, business (especially human resources), child and family advocacy, and education (from preschool and elementary school teaching to school administration). The major prepares students for academic careers as professors in human development, psychology, or sociology departments. Learning about human development also helps students understand more clearly their own development and the development of those around them.

The faculty of the Department of Human Development comes from several disciplines, including developmental and clinical psychology, sociology, and education. The diversity of faculty expertise results in a wide-ranging view of human development. The research of the department's faculty is extensive. It includes basic research on issues such as the neurobiology of personality, the role of childhood attachments in the development of adult romantic relationships, the acquisition of language in infants, and the effects of environmental stressors on children's cognitive development. It also includes applied
human ecology - 2008–2009

314

adolescence, and the relationship of religious and later scores on intelligence tests, ethnic topics have included development in families personal interest by designing a study and complete an honors thesis in an area of programs, and the impact of poverty on stress study of parent-infant interactions, the experience that many graduate and in faculty research provides the type of data collection, and data analysis. Participation to large surveys. They assist in study design, laboratory procedures to family observations use research techniques ranging from research assistants on faculty projects. Students Faculty Research.

Law Guardian’s Office of Tompkins County.

detention centers, and senior housing.

Washington, and Cornell Abroad programs Semester in New York City, Cornell in majors can arrange internships with Urban Field Placements.

many other opportunities that involve ongoing individual work with Cornell faculty or other professionals. Academic credit can be earned through all of these opportunities include the following.

Field Placements. Human development majors can arrange internships with Urban Semester in New York City, Cornell in Washington, and Cornell Abroad programs and in local agencies. These have included hospitals, psychiatric hospitals, juvenile detention centers, and senior housing. Students have also participated in projects with the Tompkins County Office of Aging, the Tompkins County Youth Bureau, and the Law Guardian’s Office of Tompkins County.

Faculty Research. Many students work as research assistants on faculty projects. Students use research techniques ranging from laboratory procedures to family observations to large surveys. They assist in study design, data collection, and data analysis. Participation in faculty research provides the type of experience that many graduate and professional schools expect from their top applicants. Recent projects have included the study of parent-infant interactions, the transition of high school students into the world of work, evaluation of pre-kindergarten programs, and the impact of poverty on stress responses in children and teens.

Independent Research. Under faculty supervision, some advanced students complete an honors thesis in an area of personal interest by designing a study and collecting and analyzing data. Recent thesis topics have included development in families that adopt school-age children, connections between speed of visual processing in infants and later scores on intelligence tests, ethnic variation in exposure to stressors in adolescence, and the relationship of religious beliefs to well-being.

Undergraduate Teaching Assistant. Advanced students can serve as undergraduate teaching assistants. This requires close work with the professor teaching the course as well as with students taking the course.

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 in a public school for a year. This certification is offered in most 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 three-month 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 housing at Cornell. 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 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 course requirement for 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

Interestsed students should complete the academic requirements for the didactic program in Dietetics, approved by The American Dietetic Association (ADA). Courses in foods, nutrition and disease, microbiology, management, statistics, and economics are added to the core curriculum (specific requirements). Evaluation of academic credentials to qualify for a dietetic internship should be completed before graduation. Seniors should initiate this academic evaluation process in March if they will graduate in January or in September if they will graduate in May. All students who will complete the academic requirements by graduation should participate in the evaluation process while at Cornell. Students who meet most but not all of the academic requirements are encouraged to have their academic work evaluated while they are at Cornell so that deficiencies can be identified and documented.

Advisors in the dietetics program can also help students plan to meet the experience or supervised practice component required for active membership and/or eligibility to take the Registration Examination to be registered as a dietitian (R.D.). 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 fitness measurements, exercise physiology, and biomechanics of human movement. Nutrition courses of special interest relate to growth and development, regulation of body weight and composition, 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 major will have concentrated knowledge in one of three policy areas: 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 also 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 programs. 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 also gives students the knowledge to build management skills for use in public, not-for-profit, and for-profit settings. Ideas of social justice, equity, and economic efficiency will be studied. Research methods, statistics, and planning concepts 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 a particular concentration area—family/social welfare, health, or market regulation. 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. Health courses cover politically sensitive programs and issues such as health care access, Medicare, Medicaid, long-term care, managed care, public health issues, and substance abuse policies. Market regulation courses cover programs and policies governing advertising, corporations, product safety, food and drug safety, nutrition policies, consumer credit insurance, telecommunications, housing, 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, Research Methods, Multivariate Statistics, Intermediate Microeconomics, and Public Sector Economics. Research Methods, Multivariate Statistics, and Intermediate Microeconomics must be completed by the second semester of the sophomore year. Students also will be expected to develop a concentration of four courses in either family/social welfare, health, or market regulation. Please check with the director of undergraduate studies for further details.

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 study. In addition to fulfilling requirements for the major, students in the honors program will participate in an honors seminar (PAM 4980) and prepare an honors 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 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.

INDIVIDUAL CURRICULUM
A student who has educational and professional objectives that cannot be met satisfactorily within the framework of existing majors in the College of Human Ecology may petition to develop an individual curriculum. To be approved, the curriculum must be within the focus of the college and be interdisciplinary in design, include at least 40 credits in human ecology courses. A student develops an individual curriculum in consultation with faculty advisors from at least two subject matter fields and the program coordinator, Patti Papapietro, Office of Admission, Student and Career Development (172 MVR). Such a program of study should encompass a substantial part of the student's undergraduate education and must include at least three semesters. For this reason, a request to follow an individual curriculum should be made after the freshman year and must be made before the second semester of the junior year.

If an individual curriculum seems advisable, the individual curriculum coordinator will provide direction in developing a formal program of study. Although the coordinator must approve an individual curriculum schedule during the course enrollment period each semester, it is the student's responsibility to follow the curriculum as planned or to have any necessary revision approved in writing by his or her advisor and the program coordinator before the program changes are made.

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). Study abroad credits do not count toward the maximum number of endowed credits that Human Ecology students are permitted to earn.

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 gain 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). Applications may be found through these resources or in the Human Ecology registrar's office (146 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 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 Bronfrenbrenner 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 4725)” involves service in 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, 255-2255) or from Nancy Wells, Bronfrenbrenner 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). The college also offers a minor in education. 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 concentrations, 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. Pursuit of a minor, 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 option 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 2 credits), students carry out internships in various medical 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, Montifiore 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, NAACPPLDF, 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,
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 only when they are certifying completion of the requirements for a graduate degree in health administration. 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 only available 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.P.S. degree in health administration. In their senior year, students will graduate with a B.A. 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 will also 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 would typically the senior year of the college registrar in Human Ecology.

ACADEMIC ADVISING AND STUDENT SERVICES

Faculty Advisors
Students who choose to major in a particular department are assigned an advisor whose special interests match their own. Students may change advisors by working with the director of undergraduate studies (DUS).

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 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, the Orientation Committee, and Human Ecology Voices. Primary responsibilities of the offices 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. When 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.

**Individual curriculum.** A student who has educational objectives that cannot be met within the framework of any single major in the college may propose an Individual Curriculum. The proposed major must be focused within the college, combine course work from at least two departments to form a theme of study, and meet all Human Ecology curricular requirements. A student develops an individual curriculum in consultation with two faculty advisors from two departments in the college and the program coordinator, Patti Papapietro, Office of Student and Career Development, 172 MVR.

A student may propose such a curriculum following the freshman year and no later than the first semester of the junior year. If the plan seems workable and advisable, it will be approved by the program coordinator as the student’s curriculum and the proposed courses will become requirements. Potential changes must be approved by the program coordinator in order to ensure completion of degree requirements.

**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 career 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 difficulties 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 progress toward 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: www.ss.cornell.edu/our. 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/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. 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 school; 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 upperclass 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, 255-1775); or Lorantine Maboe (401 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 program. 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 medical 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.

African 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
Latino American 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, 255-5245) 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 career 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; -2988) 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 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 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 College's career services web site: www.human.cornell.edu/student.

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 Undergraduates), 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 serves as a link to the university health careers network and provides guidance as students prepare for the MCAT, apply to medical school, and explore the various specialties of medicine. PATCH also offers a premed-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 operations, 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 see connected 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.

CornellTRAK. Exclusively for Cornell students, CornellTRAK 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.

InterviewTRAK. 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.

Note: Students matriculating before spring 2004 may continue to follow the older cumulative GPA standard of a 1.7 (C-) or better.

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
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 40 Human Ecology (HE) credits from Categories II and III. (HE credits from Category I may not be applied toward this requirement.) A minimum of 3 credits from the 4000–4020 special studies series courses may be used toward this requirement. 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 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 40-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 option grade 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 40 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 1000, 1010, 1200, and 2010) do not count toward either the 40-credit requirement or the 9-credit outside-the-major requirement. 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 40- and 9-credit outside-the-major requirements. These HE-prefix courses that are below 3000 level may be used as elective credit.

3. Students should refer to 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 divisions of Cornell.

Endowed Colleges
Africana Studies and Research Center
College of Architecture, Art, and Planning
College of Arts and Sciences
College of Engineering
School of Hotel Administration
Johnson Graduate School of Management

Statutory Colleges
College of Agriculture and Life Sciences
College of Human Ecology
School of Industrial Relations
College of Veterinary Medicine

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. We refer to the index 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 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 an equivalent course work taken before matriculation at Cornell.

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 may also not be used to fulfill college requirements.

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

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.
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 6310, 6340, 6520
Religious Studies
Science and Technology Studies 2050, 2060, 2350, 2500, 2810, 2820, 2860, 2920, 3580, 3600, 3890, 4330, 4440, 4470, 4720, 4810, 4900

Math Requirement
The college math requirement is being revised, and can be obtained by visiting the Human Ecology Registrar in 146 MVR Hall or by going to: www.human.cornell.edu/che/Academics/Undergraduate/Student_Services/Registrar.

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; 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 Just the Facts. 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. Human Ecology students who fail to register by the third week of 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) or counselors (Office of Admission, Student, and Career Development, 172 MVR) for more information. Students of mature status may carry 6 to 11 credits without petitioning 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 prior semester.

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 Just the Facts. Students are responsible for checking their course schedule for accurate 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.

In addition to the procedures listed below for course enrollment changes, all add/drop forms for nutritional science majors must be signed by a faculty advisor.

**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 11th week of classes. 4040 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 11th 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 wish 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. Because the faculty advisor submits requests for the students, the students do not have to finalize selections with a PIN number.

**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, but 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 a limited-enrollment course 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 the major's concentration, and the courses may not be counted toward the major's concentration. Students interested in courses with content common to both should check the curriculum of Cornell courses that have course content.

**Special Studies Courses**

Each department in the College of Human Ecology (DEA, FASD, 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 Field Work. 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 dates in the College's Academic Calendar. Check with a counselor in the Office of Admission, 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 third-week deadline, change a grade option after the third-week deadline, change 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 for 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 Admission, 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 completed form in to the registrar. The student submits the form to the Human Ecology registrar’s office (146 MVR). In absence 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 study 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 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- or 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 not 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 40 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 40 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 Admission, 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 seventh 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 during 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 the notation "Leaves of Absence." 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 medical leave of absence. Medical leaves are initiated by the student with Gannett Health Center. If Gannett Health Center recommends a medical leave for the student, the college registrar may grant the leave. A medical leave...
is for an indeterminate period of time not to exceed five years. Students who are granted a medical leave of absence should maintain contact with a counselor in the Office of Admission, 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. 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 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.

GRADERS 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 week of a two-semester course. If a student is given permission to withdraw from a course after the seventh week of the semester in which the student was registered, 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.

These are the quality point equivalents:

- A+ = 4.3
- A = 4.0
- A– = 3.7
- B+ = 3.3
- B = 3.0
- B– = 2.7
- C+ = 2.3
- C = 2.0
- C– = 1.7
- D+ = 1.3
- D = 1.0
- 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 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 must pass the required time for Gannett Health Center and 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.

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 losing 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 of incomplete. 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 directed to 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 printed every semester in the Course and Time Roster. The current exam information is also available on the university registrar's web page at www.sws.cornell.edu/our.

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 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 time 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, and 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 grades 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.

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 subject to proceedings under it if he or she:

a. Knowingly represents the work of others as his or her own.

b. Uses or obtains unauthorized assistance in any academic work.

c. Gives fraudulent assistance to another student.

d. Fabricates data in support of laboratory or field work.

e. Forges a signature to certify completion or approval of a course assignment.

f. Uses an assignment for more than one course without the permission of the instructor involved.

g. Uses computer hardware and/or software to abuse, steal, or steal equipment, or user rights of others.

h. 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.

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 the 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 (excluding 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 Admission, 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 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

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 Just the Facts.

Students should be in the habit of checking Just the Facts 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 at www.registrar.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 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.university.cornell.edu/policy/ASL.html, or talk with the college registrar.

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

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

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 Just the Facts.

Students should be in the habit of checking Just the Facts 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 at www.registrar.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 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.university.cornell.edu/policy/ASL.html, or talk with the college registrar.

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

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 GPA of 3.3 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, 255-2532) 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 Award in Oral Communication** is awarded for original oral communication projects related to the college’s mission by undergraduate students in the College of Human Ecology. The contest is held each year in February and awards prizes totaling $1,500.

**The Flora Rose Prize** is given biennially to a Cornell 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 $500.

**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 $500 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, agencies, services for elderly people and people with disabilities, as well as nutrition programs, arts organizations, and Ithaca schools. For further information, contact the Office of 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, conduct high school visits, assist with on-campus programs for high school students and potential transfer students, and help with prospective students, 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 Admission, Student, and Career Development (172 MVR, 255-5471).

The mission of the Human Ecology **Voices** is to build unity among students, faculty, and staff in the College of Human Ecology. Membership consists of all representatives of all other Human Ecology student organizations and other interested students. Patti Papapietro in the Office of Admission, Student, and Career Development (172 MVR, 255-2532), serves as Voices advisor.

**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 student listserve, 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 the 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 internships 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 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 1000 Critical Reading and Thinking
Fall, spring, or summer. 2 credits (credit toward graduation depends on individual college). Limited enrollment. Prerequisite: freshmen 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. Laboratory instruction individualized and provides the opportunity to focus intensively on increasing comprehension, reading rate, and vocabulary.

HE 1010 College Achievement Seminar
Summer, six-week session. 2 credits (credit toward graduation depends on individual college). Prerequisite: Pre-freshman Seminar 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 college work is stressed. In addition, students are introduced to library and computing resources through hands-on projects.

HE 3010 Collaborative Leadership
Fall. 4 credits. Includes required retreat beginning Fri. afternoon, Aug. 24, and ending when bus returns to campus about 4 p.m. Sun., Aug. 26. Priority given to sophomores and juniors. Letter grades only. Lec and sec. B. Bricker.

Introduces the principles of leadership theory and practice of leadership. Serves as the introduction to leadership for a leadership honors certificate but is also appropriate for students who simply want to understand leadership better. Assignments are diverse, including individual and group projects, journaling, the creation of case studies, an in-depth team project, several presentations, and a variety of other activities. More information on this course is available at the Courses of Study web site: http://cuiinfo.cornell.edu/Academic/Courses/. Complete syllabus available on request.

HE 4050 Mentoring for Advanced Students Toward Summer Internship
Spring and fall. 2 credits. Capstone course for Leadership Certificate Program.

Prerequisite: permission of instructor. Letter grades only. B. Bricker.

Supports advanced leadership students through critical months of their junior-senior project development. Taught in a small seminar format. Emphasizes reflection on the leadership experience and planning for individual projects. Reviews leadership themes and principles. With carefully selected readings and assignments, students learn to write effective grant proposals, to design evaluation programs appropriate for their leadership programs, write press releases, and think about what makes for successful lobbying for policy change. Students work together to provide critical feedback and support for one another through important challenges in their own leadership development.

HE 4070 Leadership in the Nonprofit Environment
Spring. 3 credits. Limited to 30 students. Letter grades only. Planned MWF 11:15–12:05. Staff.

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.

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
Summer, eight-week session. Variable credit. Staff.
Students participate in a community-based medical center hospital or clinic member of New York Presbyterian Hospital and Well Medical College of Cornell University. This is a four-day internship and one day of seminars per week.

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.

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. Students must register for the total credits desired for the whole project each semester (e.g., 8 credits for fall and 8 credits for spring). 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 only be taken in addition to those courses that meet the regular major requirements.

DESIGN AND ENVIRONMENTAL ANALYSIS

F. Becker, chair (E-106 MVR, 255-1950); P. Ehshelman, director of undergraduate studies; J. Elliott, director of graduate studies; A. Basinger, S. Curtis, S. Danko, J. Elliott, G. Evans, D. Feathers, K. Gibson, R. Gilmore, A. Hedge, Y. Hua, J. Jennings, J. Laquatra, W. Sims, 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 1150 Design Graphics and Visualization

Spring. 3 credits. Limited to 18 students. Prerequisites: Option I DEA majors only; DEA 1010 with grade of B- or higher. Corequisites: DEA 1020. B- or higher required to take DEA 2010. Must complete incomplete grade in this course before taking DEA 2010. Minimum cost of materials: $200; technology fee: $10. K. Gibson.


DEA 1500 Introduction to Human-Environment Relations (also COGST 1500)

Spring. 3 credits. Lec, disc. C. 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 what role the physical environment plays in human health and well-being. Our focus will be on residential environments and on urban and natural settings. We will also take a look at how human attitudes and behaviors affect environmental quality. Hands-on projects plus exams, lecture and discussion sections. Writing in Major option also available. Visit http://instruct1.cit.cornell.edu/courses/dea150.

DEA 2000 Introduction to Building Technology

Spring. 2 credits. Y. Hua.

Introduction to building technology for students in interior design, facility planning and management, and human factors. Emphasis is placed on developing basic understanding of building systems, their implications for the planning, design, and operation processes of buildings, and the impact of their performance on both occupants and the environment. Topics cover site and climate, structural systems, building envelope, passive strategies for building condition control, HVAC systems, lighting systems, acoustics, electrical systems, construction process and building maintenance, and principles of building systems integration for occupant comfort and environmental effectiveness.

DEA 2010 Interior Design Studio II

Fall. 4 credits. Limited to 18 students. Prerequisites: Option I DEA students; DEA 1010, 1020, 1110, 1150, and 1500 (minimum grades of B-); B- or higher required to take DEA 2020. Must complete incomplete in 2010 before taking 2020. 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. Includes a collaborative project with a professor and students from another design discipline. Visit http://instruct1.cit.cornell.edu/courses/dea201.

DEA 2020 Interior Design Studio IV

Spring. 4 credits. Prerequisites: Option I DEA students; DEA 2010 and 2030. Pre- or corequisite: DEA 2400. Must complete incomplete grade in this course before registering for DEA 3010. 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 2030 Digital Communications

Spring. 2 credits. Limited to 27 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 professional web-based portfolio of self-promotional materials. The primary objective is to reinforce principles of visual communications while learning the nuances of vector, raster, and html graphic software. Visit http://instruct1.cit.cornell.edu/courses/dea203/.

DEA 2040 Introduction to Building Technology

Spring. 2 credits. Y. Hua.

Introduction to building technology for students in interior design, facility planning and management, and human factors. Emphasis is placed on developing basic understanding of building systems, their implications for the planning, design, and operation processes of buildings, and the impact of their performance on both occupants and the environment. Topics cover site and climate, structural systems, building envelope, passive strategies for building condition control, HVAC systems, lighting systems, acoustics, electrical systems, construction process and building maintenance, and principles of building systems integration for occupant comfort and environmental effectiveness.

DEA 2150 Digital Graphics

Fall, first seven weeks of semester. 1 credit. Prerequisites: DEA majors or permission of instructor; DEA 1010; 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 2410 Introduction to Computer-Aided Design (CAD)

Spring, eleven weeks of semester. 1 credit. Prerequisites: DEA majors or permission of instructor; DEA 1010. 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

Spring, second seven weeks of semester. 1 credit. Prerequisites: DEA majors or permission of instructor; DEA 1010. 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, reference drawings, blocks and attributes, raster images, user coordinate systems, and customization of AutoCAD are covered. Students will be given 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. visual and behavioral assessment 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 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://instruct1.cit.cornell.edu/courses/dea251/.

DEA 2600 Special Studies for Undergraduates

Fall or spring. Credit TBA. Department faculty.

Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multiplicity description of the study they want to undertake on any form available from the College Registrar’s Office. The form is submitted to the director who registers the student and the head of the department, is filed at course registration or during the change-of-registration period.

DEA 3010 Interior Design Studio V

Fall. 5 credits. Prerequisites: DEA 1110, 1500, 2010, 2020, 2030, and 2410. Corequisites: DEA 3050 and 4590. Must complete incomplete grade in this course before registering for DEA 3010. Minimum cost of materials: $120; VRAC 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 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 ergonomics, anthropometry, biomechanics, control/display design, work physiology, and motor performance. Includes practical exercises and field project work. Visit http://ergo.human.cornell.edu.

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. Next offered 2009-2010. 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 subsystem 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 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 business documents such as working drawings and specifications, supervision of construction and installation, and cost estimation.

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 4070 Interior Design Studio VII
Fall, 5 credits. Prerequisites: DEA 3020, 3030, 3040, and 3050. Must complete incomplete grade in this course before registering for DEA 4080. 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 4080 Interior Design Studio VIII
Spring, 5 credits. Prerequisites: DEA 3010, 3020, 3030, and 3040. Minimum cost of materials: $150. S. Danko.

Design problem-solving experiences involving completion of advanced interior design problems. Problems are 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 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 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 1500. Students must have demonstrated a high level of performance in the subject to be taught and in the overall academic program. 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, 4500, 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 healthcare institutions. The course will examine the facility planning and management issues that affect the healthcare industries. The course will specifically look at how these courses 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 4210** Introduction to Facility Planning and Management
Fall. 1 credit. 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 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 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 quality of health measures.

**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. 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 2009–2010. 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. Visit http://instruct1.cit.cornell.edu/courses/dea4600.

**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. Next offered 2009–2010. 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 ergonomic 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://instruct1.cit.cornell.edu/courses/dea472.

**DEA 4990** Senior Honors Thesis
Fall or spring. Variable credit. Prerequisite: permission of thesis advisor and DEA director of undergraduate studies. Letter grades only.
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. Department 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 3020 or permission of instructor. Minimum cost of materials: $150; lab fee: $35. Next offered 2009–2010. 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. Intended for graduate students who want a more thorough introduction to programming methods than is provided by DEA 4590. Each student is required to attend DEA 4590 lectures, complete all required readings, 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 3500. Each student is required to attend DEA 4590 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 3500.

DEA 6520 Human Factors: The Ambient Environment
Spring. 4 credits. Recommended: DEA 1500. Next offered 2009–2010. 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 4590 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 4590.

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 quality of health measures.

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. 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, management, building operations, workplace change management, real estate and computer-aided facility management systems.

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 6660 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 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 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. Next offered 2009–2010. 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 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.

FIBER SCIENCE & APPAREL DESIGN

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. A course that 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: $125; lab fee: $30. S. K. Obendorf. Students develop both familiar and unfamiliar methods that enable them to draw the fashioned body and ancillary expressions of fashion. Drawing is explored as a communicative medium for visual research and as a creative tool for image creation.
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. S–U or letter grades.
A. Nettavali.
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. Nettavali.
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 (mohair) and an unknown bi-component yarn (final).

FSAD 1450 Introduction to Apparel 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.

FSAD 2270 Structural Fabric Design
Fall. 3 credits. Prerequisite: FSAD 1350. Recommended: college algebra. S–U or letter grades. Staff. Covers the elements of technical fabric design with an emphasis on woven and knitted fabrics. Topics include structure of woven and knotted 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. S. Ashdown. 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, 1540, 1550, 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 design development. 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 market design. 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.

FSAD 2900 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 multipage 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. A one-on-one 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 multipage 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, is filed at course registration or during the change-of-registration period.

FSAD 3250 Color and Surface Design of Textiles
Fall. 4 credits. Was FSAD 225. Limited to 18 students. Priority given to FSAD apparel design majors. Recommended: FSAD 1140 and 1350. Minimum cost of materials: $100; lab fee: $75. 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
FSAD 3460 Design Process
Fall. 4 credits. Limited to 30 students. Prerequisites: FSAD 1350, 2640, and 2650. Letter grades only. Minimum cost of materials: $250; lab fee: $10. V. D. Lewis. Exposition of the methods used by the creative fashion designer. Aims to develop students' personal skill as designers. Unites a provocative design issue with the requirement of functionality and emphasizes pattern cutting as a way of realizing design ideas.

FSAD 3490 Style, Fashion, and the Apparel Industry
Fall. 2 credits. Limited to 30 students. Not open to freshmen. Prerequisites: FSAD 1250, 1350, and 2570. Students should not take FSAD 3490 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: Directed Reading
Fall, summer, or spring. Credit TBA. S–U or letter grades. Staff. For advanced independent study by an individual student. Staff. For students 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 multipage 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 supervising, should register for one of the following subdivisions of independent study.

FSAD 4000: Directed Reading
Fall, summer, or spring. Credit TBA. S–U or letter grades. Staff. Apprenticeship includes both a study of teaching methods in the field and 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 4010: Empirical Research
For study that predominantly involves library research and independent reading.

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: upperclass 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 the assistantship with instruction.

FSAD 4200 History of Color and Design in Textiles (formerly FSAD 370)
Spring. 3 credits. Prerequisites: FSAD 1250 or permission of instructor. A. Racine. Explores color theory principles, color trends, science and technology of color measurement, color and design in textile construction and embellishment, design use of pigments and dyes, and history of textile design as a
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 apparel production 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 fees: $15. N. Boden

Covers evaluation of fibers, yarns, fabrics, and garments, with emphases on the meaning of standards, testing psychology, 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; next offered 2009–2010. C. C. Chu.

Chemical and physical structure of several commercially important fibers and their polymerization process. Discusses color chemistry and relationship to fiber dyeing.

FSAD 4390 Biomedical Materials and Devices for Human Body Repair (also BME 5390)
Spring. 2–3 credits. Prerequisites: junior or senior standing; college national science requirement (chemistry or biology). S–U or letter 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. Brenn.

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 4650 Textiles, Apparel, and Innovation
Fall. 3 credits. Prerequisite: FSAD 2370. Recommended: FSAD 4520. S–U or letter grades. Cost of field trip: $100. Offered alternate years. J. Hinenrosta.

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 gain an understanding of presentation methods currently used by fashion designers, runway illustrative journalists, forecasting artists, and fashion editorial illustrators. Skills in fashion illustration, image manipulation, and photography are developed. To satisfy personal philosophies of fashion, students discover and adopt current presentation techniques with new and original effects. Students must bring all past project work for possible inclusion in the portfolio.

FSAD 4990 Honors Thesis Research
Fall and spring. 1–6 credits; max. 6 credits for graduation. Prerequisite: FSAD students admitted to college honors program. S–U or letter grades. Staff.

Independent research leading to the honors thesis. Students must follow college honors program guidelines.

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 graduate chair and approved by the department chair and instructor.

FSAD 6160 Rheology of Solids: Dynamic Mechanical Analysis of Fibers and Polymers
Spring. 3 credits. S–U or letter grades. J. Hinenrosta.

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. A. Netravali.

Covers formation and properties of fiber-forming polymers, rubber, glassy, and crystalline state transitions. Discusses fiber structure, relationship between chemical structure and physical properties of manufactured and natural fibers, mechanical, thermal, and viscoelastic properties of fibers and testing methods.

FSAD 6260 The Chemistry of Textile Finishes and Dyeing
Spring. 3 credits. Prerequisites: FSAD 3560 or equivalent and organic chemistry course or permission of instructor. S–U or letter grades. Offered alternate years. C. C. Chu.

Discusses chemical aspects of textiles with emphasis on finishes and dyeing. Studies industrially important textile chemicals used for dyeing and enhancing fiber and fabric properties, such as durable press, anti-soiling, water repellency. Emphasizes the correlation of the observed effect with chemical structure, end-use influences, interaction with fabric and fibers, sources, and synthetic routes. Briefly discusses the environmental effect of these textile chemicals and current federal regulation.

FSAD 6370 Research Seminars in Apparel Design
Fall and spring. 1 credit; repeat of course each semester encouraged for all apparel graduate students. Prerequisites: permission of individual instructor for advanced undergraduates. S–U grades only. Apparel Design faculty.

FSAD 6390 Mechanics of Fibrous Assemblies
Fall. 3 credits. Prerequisite: solid mechanics course or permission of instructor. S–U or letter grades. Offered alternate years; next offered 2009–2010. J. Hinenrosta.

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. S. Ashdown.

Seminar course focusing on the human form and its relationship to clothing. Includes discussion of quantification of body sizes and human variation; historical, cultural, and aesthetic concepts of fit; apparel sizing techniques; national and international sizing systems and standards; impact of sizing systems on various populations (e.g. elderly, disabled).

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; next offered 2009–2010. M. Frey.

Covers the practical and theoretical analysis of the chemical and physical principles of the methods of converting bulk polymer to fiber.

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; next offered 2009–2010. Minimum cost of materials: $250. V. D. Lewis.

Provides students with the theoretical tools that will enable them to conduct debates and create strategy about the design of fashion.
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.
Examines the aesthetic and social/psychological relationship between body and clothing in the context of various cultures.

FSAD 6950 Bringing Social Responsibility to Apparel Corporate Culture
Fall; web-based 4-week course. 1 credit.
Limited to 10 students. S–U or letter grades. S. Loker and M. Dickson (U. of Delaware).
Importance of leadership, the role of inspirational leadership, and the opportunities for making a difference will be explored, analyzed and applied. Social change is the emphasis of this course—how you can help build a socially responsible workplace.

FSAD 6970 Worker-Centric Social Responsibility for Apparel Industry
Fall; web-based 4-week course. 1 credit.
Limited to 10 students. S–U or letter grades. S. Loker and M. Dickson (U. of Delaware).
Examines the rights of workers. Explores obstacles in meeting and methods for assuring worker rights, including freedom of association. Consideration is given to how to effectively engage with workers.

FSAD 6990 Producing Environmentally Responsible Apparel
Fall, web-based 4-week course. 1 credit.
Limited to 10 students. S–U or letter grades. S. Loker.
Examines environmentally responsible apparel production and practices as philosophy, process, and competitive business strategy. Analyzes sustainable production in the context of a business’ physical plant, materials, and resource use.

PSYCH 1101 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

HD 1150 Human Development
Fall or summer. 1 credit. Enrollment in fall limited to 10 students. Enrollment in fall and summer limited to students enrolled in HD 1150. Letter grades only. C. Schelhas-Miller.
HD 1150 introduces students to the basic concepts, theories, and research in human development as they explain prenatal development and development in infancy, childhood, and adolescence. 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 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 1160 Section for Introduction to Human Development
Fall or summer. 1 credit. Enrollment in fall limited to 10 students. Enrollment in fall and summer limited to students enrolled in HD 1150. Letter grades only. C. Schelhas-Miller.
HD 1160 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 2180 Human Development: Adulthood and Aging
Spring. 3 credits. Prerequisite: HD 1150 or PSYCH 1101 or permission of instructor. 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 2330 Children and the Law
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 2380 Thinking and Reasoning (also COGST 2380)
Fall. 3 credits. Prerequisite: HD 1150 or PSYCH 1101. Next offered 2009–2010. 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 2500 Families and the Life Course (also SOC 2500)

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.
Examines 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 theories of aging (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.

Views 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 HD 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 2350 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. S–U or 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 3340 The Growth of the Mind (also COGST 3340)]**

Spring. 4 credits. Recommended: course in experimental psychology, statistics, or HD 1150 or equivalent, or permission of instructor. S–U or letter grades. Next offered 2009–2010. 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 child's acquisition of knowledge and understanding to their final representation? What are the relations between language and thought? In the study of these 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 3470, PSYCH 3470, PSYCH/LING/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, neuropsychology, biology, or linguistics. S–U or letter grades only: H. Segal.

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 semantic from infancy on. The fundamental issues of relationship 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 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., prematurity, 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: BIOL 1101 or 1109 or equivalent, and HD 1150 or PSYCH 1101. Offered alternate years. 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, biological, and psychological 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 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 2500. 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. K. Cohen.

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. The course 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**


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, 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, PSYCH 2280/4600. 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 early stages 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: HD 1150. S–U grades only. 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 on an experimental basis 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 multipage description of the study they want to undertake, submit it for approval 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 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 involves library research and analysis, or laboratory or studio projects.

**4020: Supervised Fieldwork.** Prerequisite: permission of instructor. For study that involves library research and analysis, or laboratory or studio projects.

**4030: Teaching Assistantship.** Prerequisite: permission of instructor. For study that involves library research and analysis, or laboratory or studio projects.

**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 2350 or PSYCH 2650, S–U or letter grades. G. 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, evidence of disturbed, 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 2380, 2500, or 2510 or permission of instructor. Letter grades only. Next offered 2009–2010. 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. 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 Laboratory in 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 laboratory 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 4310 Mind, Self, and Emotion**
Spring. 3 credits. Limited to 20 students. Prerequisites: upperclass undergraduate or graduate standing; HD 1150 or PSYCH 1010. Letter grades only. Offered alternate years. 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. The "scale of observation" is viewed as occurring within the person (i.e., genetics, development), at the level of the person (e.g., content—goals, beliefs, desires), 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 +520, 6 COGST 4320). Prerequisites: junior or senior standing; HD 1150 or PSYCH 1010 or permission of instructor.
V. 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 phenomemonal 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 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 Neuroendocrinology**
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 2009–2010.
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, 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 2009–2010. 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)**
Spring. 2 credits. Limited to 20 students. Prerequisite: HD/COGST/PSYCH/LING 3570 or equivalent. B. Lust.
Optional supplement to the survey course Language Development (COGST/HD/LING/PSYCH 3570). 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 3450, and 5480; 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; next offered 2009–2010. 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 constructs 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 SOC 2510. Letter grades only. Offered alternate years; next offered 2009–2010. 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 4640 Adolescent Sexuality (also FGSS 4670)**
HD 4660 Psychobiology of Temperament and Personality
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 BION 2220 OR one course in neuroscience beyond 2000 level 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 separable “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. Offered alternate years. 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. Discussion and presentation of honors theses being completed by HD seniors.

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 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. 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., aggravation v. 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., anxiety, intelligence testing, educational disability, mental illness and the DMS-IV, social and family environment, prediction of future dangerousness, anti-social personality).

HD 6170 Adolescence
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, and 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. Kosowsky. Designed as an orientation to the department and the university. Activity includes 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. 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)
HD 6330 Language Acquisition Seminar fall. I–IV cr. 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 2009–2010. 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...
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 professorate.

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 691.

[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 topic 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.
Students learn the logic and methods of social science research, as well as how to create researchable questions out of their issues of interest. Readings, written assignments, and in-class exercises focus on stating hypotheses, designing studies and samples to test hypotheses, regression, analysis of variance, and simple statistical analysis. PM 2220 should take this course no later than their junior year.

**PAM 2220 Controversies about Inequality (also PHIL 1920, DSOC/GOVT/ILROB/SOC 2220)**
Spring. 4 credits. S. Morgan.
For description, see SOC 2220.

**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 2310 Multiple Regression Analysis**
Fall or spring. 4 credits. Prerequisites: PAM 2100, AEM/ILRST 2100 or equivalent. Sec meets once a week. C. Lucarelli 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 3300 Intermediate Policy Analysis**
Spring. 3 credits. E. Owens.
This course examines evaluation methods used to judge whether public policies and programs are effective in achieving their goals. Policymakers 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 3330 Law, Economics, and Public Policy**
Fall. 3 credits. Prerequisite: ECON 1110. S–U or letter grades. E. Owens.
This class explores the impact of formal and informal institutions on economic transactions. Special emphasis will be placed on the development of legal institutions in the United States. Topics covered include: property rights, torts, negligence and liability, contracts and exchanges, criminal control and enforcement, equity issues in the market environment.

**PAM 3340 Corporations, Shareholders, and Policy**
Fall. 3 credits. Prerequisite: ECON 1110, PAM 2000 and 2100. S–U or letter grades. R. Geddes.
Uses economic analysis to study the interaction of the market, the corporation, and the law and how these interactions affect the well-being of shareholders and consumers. Examines the costs and benefits of the corporate form of organization. The legal institutions defined in the course, such as limited liability and shareholder voting, are analyzed along with regulations governing these institutions. A particular focus is mechanisms that control the behavior of managers. Those mechanisms include hostile takeovers, insider trading, outside directors on the board, the role of large investors, and executive compensation plans. Additional topics include governance of partnerships and nonprofit enterprises.

**PAM 3350 Low-Income Families: Qualitative and Policy Perspectives**
Spring. 3 credits. M. Waller.
Examines the experiences and challenges of low-income families in the contemporary United States as documented in qualitative and policy research. Also looks at policies designed to assist these families. Considers such topics as the characteristics and causes of poverty, changes in family structure and the emergence of fragile families, nonresident fathers’ relationships with their children, families’ participation in the welfare system and low-wage labor market, and socioeconomic variations in parenting and child well-being.

**PAM 3360 Evolving Families: Challenges to Family Policy (also SOC 3360)**
Fall. 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, ethnic 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 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
Spring. 3 credits. Prerequisite: ECON 1110 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 3460 Economics of Social Security (also ECON 4470)
Fall. 3 credits. Prerequisite: PAM 2000 or equivalent. S–U or letter grades. Next offered 2009–2010. R. Burkhauser.

PAM 3500 Contemporary Issues in Women's Health (also FGSS 3500)

PAM 3770 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 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 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 multiplicity 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 4230 Risk Management and Policy
Spring. 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 comfort with 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 4330 Topics in Corporations and Policy
Spring. 3 credits. Prerequisite: PAM 2000, PAM 3100, PAM 3340. S–U or letter grades. R. Geddes.
This course focuses on several current key policy issues relating to the corporate form of organization. The course format will be a mixture of lecture, discussion, and student presentations. Topics will be chosen on the basis of their relevance to corporate governance, their relationship to important policy questions and their timeliness. The course is designed to explore in greater detail topics discussed in PAM 3340 Corporations, Shareholders, and Policy that are presently in the policy arena. The number of topics is necessarily more limited. The course will explore those topics by examining recent legal, economic, and policy literature to gain a thorough understanding of each topic. One particular focus of the course will be on the differing approaches to corporate governance internationally.

PAM 4350 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 4380 Economics of Health Policy
Spring. 3 credits. Prerequisite: ECON 1110 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 4430 Economics of Public Health
Fall. 3 credits. Prerequisites: ECON 1110 or equivalent. S–U or letter grades. D. Kenkel.
Uses the economic approach to study public health policies. Public health policies focus on tobacco, obesity, alcohol, illicit drugs, gun violence, sexually transmitted diseases, and other major causes of death and disease. Students will apply the concepts of market failures and the principles of cost-benefit analysis to public health problems. Students will examine how private sector advertising and public information campaigns, taxation, regulation, prohibition, and litigation affect public health. The course will also examine policies to address health disparities related to socioeconomic status.

PAM 4440 Violence against Women: Policy Implications and Global Perspectives (also FGSS 4480)

PAM 4570 Innovation and Entrepreneurship in the Health Care Industry
Fall. 3 credits. Prerequisite: PAM 4350 or permission of instructor. J. Kuder.
Designed for students interested in the management, financing, and development of innovation in the health services industry. The unique features of the health delivery system are emphasized as students learn about developing creative approaches to health services problems. Approaches to managing change are taught with case studies from a wide range of industries. Students are taught tools for critically evaluating and implementing new business concepts in for-profit and not-for-profit firms. Both the creation of new start-up companies and innovation within exiting firms are explored.
PAM 4980 Honors Seminar
Fall. 3 credits. Prerequisites: PAM 2100 and PAM 3100. Letter grades only. S. Sasser.
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 credits of thesis credit is determined by the student’s research mentor. See the director of undergraduate studies for more details.

PAM 5470 Microeconomics for Management and Policy
Spring. 4 credits. S–U or letter grades. S. Nicholson.
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
Spring. 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. Breadth 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 5550 Managed Health Delivery Systems: Primary–Ambulatory Care
Fall. 3 credits. Prerequisite: PAM 5570 or permission of instructor. Next offered 2009–2010. J. Kuder.

PAM 5551/2 Field Studies in Health Administration and Planning
Fall or spring, fall PAM 5551, 1 credit; spring PAM 5552, 3 credits; 4 total credits. Capstone course for second-year Sloan students. J. Kuder.

PAM 5620 Finance (also AEM 3240)
Spring. 3 credits. Staff.
For description, see AEM 3240.

PAM 5620 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 on a 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
Fall. 3 credits. C. Lucarelli.
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
Spring. 3 credits. Prerequisite: Sloan MHA 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. C. Lucarelli.
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 MHA 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 various 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, including 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
PAM 5720 Economic Evaluations in Health Care
Fall. 3 credits. Recommended: background in microeconomics and statistical tools.

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. 2 credits. 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, and assisted living. 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 5770 and a basic multivariate statistics course or permission of instructor. S–U or letter grades. Next offered 2009–2010. J. Kuder.

PAM 5900 Special Topics in Health Administration and Finance
Fall or 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 range from intensive courses offered over several full days to longer courses meeting on a weekly basis.

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 6050 Experimental, Quasi-Experimental, and Economic Evaluation Methods
Spring. 3 credits. Highly recommended: background in statistics (e.g., ECON 7100 or equivalent) and microeconomics (e.g., PAM 2000 or ECON 6390). E. Peters.
Focuses on quantitative methods of policy analysis and program evaluation, with an emphasis on those programs and policies that are related to health care and consumer issues. The first part of the course covers experimental design and methods of making causal inferences from non-experimental data. The second part covers benefit-cost analysis, explicitly incorporating both equity and efficiency considerations. Throughout the course attention is paid to the role of economic modeling in program evaluation, including the role of structural theoretical models and general equilibrium analysis.

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.
M. Waller.
Introduces students to theories and methods of data collection techniques such as in-depth interviews, ethnography, focus groups, and surveys as well as mixed-method approaches used in policy and evaluation research. Addresses the strengths and weaknesses of various methods and the design of qualitative and mixed-method studies. Covers epistemology, ethics, induction and deduction, measurement, validity, and triangulation. Also discusses more concrete issues such as gaining access to a field site, developing a qualitative interview guide and survey questionnaire, conducting a qualitative interview, managing data, and assessing data quality.

PAM 6050 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 micro- 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 6060 Demographic Techniques (also DSOC 6800)
Spring. 3 credits. S–U or letter grades. D. Gurak and D. Lichter.
For description, see DSOC 6800.

PAM 6080 Economics of Consumer Demand (also AEM 6700)
Spring. 3 credits. Prerequisite: graduate course in econometrics (e.g., ILRLE 7480–7490 or AEM 7100). J. Matsuura.
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 6310 Ethics, Public Policy in American Society
Fall. 3 credits. Prerequisite: senior or graduate standing. Next offered 2009–2010. J. Ziegler.

PAM 6320 The Intergovernmental System: Analysis of Current Policy Issues
Fall. 3 credits. Prerequisite: graduate students or seniors who have had course in American government. J. Ziegler.
Offers advanced policy analysis of current political/social/economic issues in the context of the intergovernmental system. Pays particular attention to how certain policy and human service issues are played out at the federal, state, and local levels of government, and to the formulation of federal and state budget policy. Considers public administration theory. Students work in teams on a policy/administrative research project and report to the class.

PAM 6330 Seminar in Pharmaceutical Policy Issues
Spring. 2 credits. Meets once a week. S–U or letter grades. S. Tennyson.
Exposes students to, and fosters critical thinking about, consumer and health policy issues related to pharmaceuticals and the pharmaceuticals industry. A key component of the seminar is invited presentations from practitioners and researchers in pharmaceutical policy. Specific topics vary and depend in part on the interests of the invited speakers. Students are required to write critiques of invited papers and a literature review on a selected topic in pharmaceutical policy.

**PAM 6400 Consumers, Information, and Regulatory Policy**
Fall. 3 credits. Prerequisites: PAM 6390 or calculus and intermediate microeconomics. S. Tennyson.
Evaluates information problems in markets and how they affect consumers, focusing on market mechanisms and regulatory actions that address those information problems. Major theoretical topics include price and quantity uncertainty, moral hazard, adverse selection, and principal-agency theory. The course gives an overview of market mechanisms that deal with information issues such as marketing, advertising, warranties, third-party certification, licensing, and self-regulation. The major regulatory institutions that govern consumer policy including the Food and Drug Administration and the Federal Trade Commission, and the way the legal system provides consumer protection. The market for pharmaceuticals is a particular focus. Primary reading material is drawn from economics and policy journals, and papers from the *Journal of Public Policy and Marketing*.

**PAM 6910 Health Economics I (also ECON 6910)**
Fall. 3 credits. First course in Ph.D.-level health economics sequence. Prerequisites: Ph.D.-level courses in microeconomic theory and econometrics. Staff.
Introduces core 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 6920 Health Economics II**
Spring. 3 credits. Prerequisites: Ph.D.-level courses in microeconomic theory and econometrics. D. Kenkel.
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 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**

- Allen, Henry, J.D., Cornell U. Lec., Policy Analysis and Management
- 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. and Chair, Design and Environmental Analysis
- Belmonte, Matthew P., Boston U. Asst. Prof., Human Development
- Brainerd, Charles, Ph.D., Michigan State U. Prof., Human Development
- Casasola, Marilena, 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
- Cochran, Moncrief, Ph.D., U. of Michigan. Prof., Human Development
- Cornelius, Steven W., Ph.D., Pennsylvania State U. Assoc. Prof., Human Development
- Danko, Sheila, M.D., Rhode Island School of Design. Assoc. Prof., 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
- Eckerode, John J., Ph.D., Tufts U. Prof., Human Development
- Elliott, John, M.E. Des., U. of Calgary (Canada). Assoc. Prof., Design and Environmental Analysis
- Elsheiman, Paul E., M.F.A., U. of Illinois. Prof., Social, Economic 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., U. of North Carolina State U. Asst. Prof., Fiber Science & Apparel Design
- 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
- Hazan, Cindy, Ph.D., U. of Denver. Assoc. Prof., Human Development
- Hedge, Alan, Ph.D., U. of Sheffield (England). Prof., Design and Environmental Analysis
- Hinstroza, 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
- Kenkel, Donald, Ph.D., U. of Chicago. Prof., Policy Analysis and Management
- Koslosky, Barbara, Ed.D., Harvard U. Assoc. Prof., Human Development
- Laquatra, Joseph Jr., Ph.D., Cornell U. 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; Interim Dean
- Maxwell, Lorraine E., Ph.D., City U. of New York. Assoc. Prof., Design and Environmental Analysis
- Netravali, Anil, Ph.D., North Carolina State U. Prof., Fiber Science & Apparel Design
- 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
- Perosio, Debra, Ph.D., Cornell U., Lec., Policy Analysis and Management
- Peters, H. Elizabeth, Ph.D., U. of Chicago. Prof., Policy Analysis and Management
- Pillerme, 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
- Sallas, 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, Kosal, Ph.D., U. of Maryland. Asst. Prof., Policy Analysis and Management
Sims, William R., Ph.D., Massachusetts Inst. of Technology. Prof., Design and Environmental Analysis
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
Wallah, Maureen R., Ph.D., Princeton U. Asst. 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
Wellington, 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
Abdus, Salam, Ph.D., U. of Minnesota. Lec, Policy Analysis and Management
Allen, Henry, J.D., Cornell. U. Lec, Policy Analysis and Management
Basinger, Annette, B.A., Michigan State U. Lec., Design and Environmental Analysis
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
Unur, Ali Sinan, Ph.D., Cornell U. Lec., Policy Analysis and Management


**SCHOOL OF INDUSTRIAL AND LABOR RELATIONS**

**ADMINISTRATION**
Harry C. Katz, dean
Robert Smith, associate dean, academic affairs
Gordon Law, librarian
Joseph Grasso, director, administrative services
Martin Wells, director, research
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**

<table>
<thead>
<tr>
<th>Degree Programs</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial and Labor Relations</td>
<td>B.S.</td>
</tr>
<tr>
<td></td>
<td>M.I.L.R.</td>
</tr>
<tr>
<td></td>
<td>M.P.S.</td>
</tr>
<tr>
<td></td>
<td>M.S.</td>
</tr>
<tr>
<td></td>
<td>Ph.D.</td>
</tr>
</tbody>
</table>

**THE SCHOOL**

The School of Industrial and Labor Relations at Cornell 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 psychologist 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 associate 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 qualify of life for ILR students. For more information, see the Multicultural Affairs web site: www.ilr.cornell.edu/student-services/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 problems and 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 associate 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 qualify of life for ILR students. For more information, see the Multicultural Affairs web site: www.ilr.cornell.edu/student-services/advising/multicultural.

**Study in Absentia**

Registration in absentia enables a student to seek admission to 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 medical 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 (ILHR 2000)** 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

**Junior and Senior Years**

ILR Elective courses—40 credits

• 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

**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 5 or better on the AB or 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 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... | 350 | 2008–2009 | Industrial and Labor Relations | MINOR...
SPECIAL ACADEMIC PROGRAMS

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 dismissal 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 clinic or infirmary treatment;
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 1997 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 ([unco.cornell.edu/Academic/AIC.html](http://unco.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 to concentrated study in an area of specialization in the school for a master of science degree.

Credit Internship Program
The ILR Credit Internship Program afford students 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 bk308@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 the student earns 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 workplaces. 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 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 bk308@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 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 satisfy up to 9 hours of academic credit earned abroad with credits 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. Application includes a tentative class schedule, 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, ILR study abroad coordinator, 101 Ives Hall, 255-2225, kh64@cornell.edu, or the Cornell Abroad office, 500 Caldwell Hall, 255-6224, CornellAbroad@cornell.edu, www.cuabroad.cornell.edu.

ILR/UCD 2010 Labor and Employment Law
Fall and one sec in spring. 3 credits. M. Gold, J. Gross, K. Griffith, and R. Lieberwitz. Survey and analysis of the law governing labor relations and employment 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.

ILR/UCD 2050 Collective Bargaining
Fall and spring. 3 credits. R. Givan, H. Katz, D. Lipsky, S. Kuruvilla, 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 changes in unions and employers today; U.S. industrial relations in international and comparative perspective.

ILR/UCD 2090 Work and Labor in the Global Economy
Fall. 3 credits. Limited to 20 students. Fulfills sophomore writing requirement. R. 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.

ILR/UCD 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.

COLLECTIVE BARGAINING, LABOR LAW, AND LABOR HISTORY

ILR 1100 Introduction to U.S. Labor History
Fall and spring. 3 credits. R. Applegate, 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 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 3050 Introduction to Labor Arbitration and Alternative Dispute Resolution
Fall. 4 credits. J. Gross. Introduces a survey that focuses on the U.S. labor arbitration process in the private and public sectors (legal issues, discipline and discharge, contract language interpretation, remedies, and procedures) and on alternative dispute resolution systems in the United States and other countries. Student participation in class discussion is expected, and assignments include an original research paper.

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 Since the Civil War
Spring. 4 credits. R. Applegate. Surveys the history of U.S. business enterprise since the establishment of a nationally unified political economy. A focus on the corporation’s emergence as the dominant form of business organization in the context of changing government-business relations. Students examine distinctive features of American business development—such as the preeminence of “big business,” corporate governance by managerial hierarchies, and the multinational scope of corporate operations—by exploring the circumstances of their creation, the private-sector limits of their reach, and their consequences for economic development and industrial relations.

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 governmental and non-governmental 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, and the role of 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 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 a Global Crisis
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. Explores various aspects of unions’ attempts to organize workers: including why some workers join unions and others do not; strategy and tactics implemented by unions and management during organizing campaigns; present status of labor law as it affects organizing; creative approaches to union organizing; and the organizing model of unionization.

ILRCB 4020 Farmworkers (also LSP/HIST/LATA 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 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 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 relevant 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. Each semester, students can register for 4 credits; grades of A, B, C, D, and P are assigned on a pass/fail basis. Students 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. H. Katz, S. Kuruvilla, and L. Turner. Comprehensive introduction to the industrial relations system in 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 5010 Labor and Employment Law
Fall. 3 credits. Prerequisite: graduate standing. M. 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 organizing and negotiations and 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 development of 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, J. 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, share capitalism, union democracy, and the expanding authority of the federal government.

ILRCB 5040 The U.S. Industrial Relations System
Fall or spring. 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 process 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. M. Gold, K. Griffith, and R. Lieberwitz.
Undergraduate seminar whose 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. Seebier.
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. D. Lipsky and R. Seebier.
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). It focuses primarily on the use of mediation and arbitration but also deals with other dispute resolution techniques, such as fact-finding, facilitation, mini-trials, early neutral evaluation, 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 6015 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 6016. L. Adler.
Takes a similar approach to ILRCB 6016, 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 ways in which employees' rights are advanced or constricted by law. There are considerable reading responsibilities.

ILRCB 6016 Employment Law II
Spring. 3 credits. Prerequisites: ILRCB 2010, 5010, or permission of instructor. Attendance and class participation mandatory. May be taken either before or after ILRCB 6015. L. Adler.
Takes a similar approach to ILRCB 6015, 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 workfare 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 ways workers’ rights are advanced or constricted by the law. There are considerable reading responsibilities.

ILRCB 6018 Current Issues in Collective Bargaining: Theory and Practice
Spring. 4 credits. K. Bronfenbrenner.
Designed to provide an in-depth examination of the contemporary collective bargaining process from a strategic and theoretical perspective. This is achieved both through a review of recent literature on bargaining theory and practice and through the analysis and evaluation of a variety of actual contract negotiations from a variety of industries, unions, strategic models, and outcomes. Subjects include: changing bargaining climate, bargaining theory, changes and variations in bargaining structures and practices, union and company power analysis, role of membership in bargaining, interest-based bargaining, strategic coordinated campaigns, strikes and lockouts, bargaining in a global economy, community labor coalitions, concessions and job security, and settlement and defining victory.

ILRCB 6020 Arbitration
Fall and spring. 4 credits. Limited to 21 students. Prerequisites: ILRCB 2010, 2050, 5000, and 5010. 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 origins 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 changes in the 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 other 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 6080 Sex Discrimination and the Law
Fall or spring. 4 credits. Prerequisites: ILRCB 2010, 5010, or permission of instructor. R. Lieberwitz.
Lec 01—Examines various legal issues relevant to the discrimination based on sex. Problems analyzed include sexual harassment, pornography, reproductive rights, prostitution, work-family conflict, inequality in employment opportunities, gay and lesbian rights, welfare rights, and affirmative action.

ILRCB 6080 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.
Lec 04—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 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 an 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. Salvatores.
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 and R. Lieberwitz.
Examines the laws against employment discrimination based on race, color, religion, sex, national origin, age, and disability.

ILRCB 6860 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 management and the 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 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 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 (both classical, 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 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 negotiation is 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 outcomes for the most effective application of these skills.

**ILRCB 7081 Seminar in American Labor History (also HIST 6830)**

3 credits. Prerequisite: graduate standing and permission of instructor. N. Salvatore. Explores the relationship of scholarly biographical writing to the field of American social history. More and more historical biographies look to incorporate social analyses at the center of their biographical structures. Students read, discuss, and analyze the varied strengths and weaknesses of a number of these efforts. The author’s understanding of the play between biographical subject and the larger social context, and its meaning for the structure of the book, are a point of inquiry that encourages numerous approaches and interpretations. A research paper is required.

**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. 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); K. Hallock, J. Hausknecht, R. Hewerston, L. Dyer, chair (387 Ives Hall, 255-8805); C. Warzinski, W. Wasmuth, P. Wright (387 Ives Hall, 255-8805).

**ILRHR 2600 Human Resource Management**

Fall. 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 2680 Job Loss**

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.

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 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. 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 3650 Organizational Consulting: Process and Results
Fall. 4 credits. Prerequisite: ILRHR 2600 or equivalent. R. B. Hewston.
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 concomitance 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.
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 specificities 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 functioning 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 4602 Cross-cultural Perspectives on Work
Fall and spring. 4 credits. 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 global workforce 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 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 and J. Hausknecht.
Seminar designed to provide an overview of the process of staffing staff positions with both internal and external applicants. Through a combination of lectures, cases, and projects, the course covers strategy, 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.

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. Keohoe.
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.
Broadsly 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 4670 Leadership Development
Spring. 4 credits. Prerequisite: ILRHR 2600 or equivalent. L. Dragons.
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 covered 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 module 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 6510 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 tools designed to provide practice with the concepts being learned.

ILRHR 6590 HR Challenge: Balancing, Ethics, Economics, and Social Responsibility
Spring, seven-week course. 1.5 credits. Limited to 15 students. Prerequisite: ILRHR 2600/5600. M. Miller 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 the 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. Prerequisite: ILRHR 2600 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, entrance, 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 2600 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 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. 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 for two weeks 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
Fall, seven weeks. 2 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 reform strategies, 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 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 6610 Applied Personal and Organization Development
Fall. 4 credits. Prerequisite: senior or graduate standing. C. Warzinski.
Experiential course that deals with OD and its role in the organizational change process. Combines the opportunity for hands-on practice in a workshop setting. Students are responsible for researching and writing a paper that examines a specific method, technique, or critical issue; preparing an in-class demonstration/presentation illustrating applications of a chosen subject; and completing a final project requiring a comprehensive proposal that describes an appropriate and logically supported intervention strategy.

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 2600/5600 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 Leadership**

Fall. 4 credits. Limited enrollment. Prerequisite: ILRHR 2600/5600; three other courses in human resource studies; permission of instructor. P. Wright.

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 and backward 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 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 6670 Diversity and Inclusion in Organizations**

Spring. 4 credits. Prerequisite: ILRHR 2600/5600 or permission of instructor. Explores diversity management in organizations. The primary goals are to increase students' knowledge of strategic and tactical uses of HR practices and policies to effectively manage organizational diversity issues and to create inclusive work climates. In addition, the course aims to develop students' skills in the practical management of diversity, particularly linking diversity strategy to business strategy and developing diversity initiatives to help improve organizational competitiveness and enhance bottom-line outcomes.

**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 50 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 and why. 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 HRM 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. Focuses on 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. R. 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 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.

Comparative study of human resource policies and institutions in Western Europe, North America, Japan, and East Asia (with special emphasis on math and science education) and of the effects of these institutions on productivity, growth, and equality of opportunity. The institutions studied include primary and secondary education, apprenticeship, employer training, and higher education. Data on the consequences of policies are presented and an effort made to understand how human resource policies and institutions have contributed to the rapid growth and low levels of inequality in Europe and East Asia. An important focus of the course is understanding the causes of the low levels of achievement of American high school students relative to their counterparts abroad.

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. Honnighouse.
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.

ILRHR 7560  Organizational Consulting  Fall. 3 credits. Prerequisite: ILRHR 5600. C. Ellis.
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 6990 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 change 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.

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 invited 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.

INTERNATIONAL AND COMPARATIVE LABOR

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 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 state development; and the role of the private sector in combating poverty and low earnings. The second half of the course is on labor markets in a globalized world. Topics are: the impact of economic liberalization, authoritarianism, and demilitarization.移动端 termly studies of corporate self-regulation and mandatory government and international standards on human rights, labor rights, and the environment. Classes then move to topical studies of China 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 international standards in the field of corporate social responsibility (CSR) and socially responsible investment (SRI) in a context of global 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 China 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 international standards on corporate activity.

ILRIC 4310 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 demilitarization on contemporary labor organizations in the region. Countries examined include, but are not limited to, Mexico, Brazil, Argentina, Chile, Peru, and Guatemala.

ILRIC 4320 Global Debates and Comparative Political Economy

Fall and spring. 4 credits. Prerequisite: graduate standing. L. Turner.

For description, see ILRIC 4320. The subject matter is similar, but the focus is on voluntary corporate self-regulation and international standards on human rights, labor rights, and the environment. Classes then move to topical studies of China 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 international standards on corporate activity.


Spring. 4 credits. Prerequisite: IRLE 2400 or IRLE 5400 or ECON 3150. G. Fields.

The first half of the course is on distribution and development: theory and evidence. Topics are: the development challenge; inequality, poverty, mobility, and social welfare; and employment, earnings, and poverty reduction. The second half of the course is on labor markets in a globalized world. Topics are: the globalization context; modeling labor markets and labor market policies; public policies to combat poverty and low earnings; and the role of the private sector in combating poverty and low earnings.

ILRIC 4990 Directed Studies

For description, see "Collective Bargaining, Labor Law, and Labor History."
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.

(ILRIC 7370 Special Topics: Labor, Democracy, and Globalization in the South)
ILRIC 7390 The Political Economy of Mexico
Fall. 4 credits. M. Cook.
For description, see ILRIC 3390. Graduate students attend ILRIC 3390 lectures, meet with the professor, and write a research paper.

ILRIC 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.

ILRIC 7990 Directed Studies
For description, see "Collective Bargaining, Labor Law, and Labor History."

Other courses approved to fulfill the ILRIC distribution requirement
ILRCB 3630 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. Nishi.
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. Nishi.
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.

ILRLE 4420 The Economics of Employee Compensation
Fall and spring. 4 credits. Prerequisites: ILRLE 2400 or equivalent. Staff.
Discusses the nature and development of the labor market and the determination of wages and prices. Examines how economic forces affect the labor market and how it affects the economic forces.

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.
Focusses 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 development 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 occupation, earnings, and productivity; 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, 10 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 3410. 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.L.R. candidates. Prerequisite: 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, 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 discussion 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 areas 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, rank-reduced, 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 models. Covers not only the statistical issues but also the links between behavioral theories in the social
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.

ILLRLE 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 or spring. 4 credits. Prerequisite: one or more courses in OB and/or sociology.

ILROB 2220: Controversies about Inequality (also SOC/PAM/DSOC/GOVT 2220, PHIL 1920)  
Spring. 4 credits. S. Morgan.  
For description, see SOC 2200.

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 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.

ILRROB 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.

ORGANIZATIONAL BEHAVIOR  
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 ceremonial 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.

ILRROB 3700: The Study of Work Motivation  
Fall. 4 credits. 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.
ILR0B 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 become 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.

ILR0B 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.

ILR0B 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.

ILR0B 4250 Seminar in Organizational Culture
Spring. 4 credits. Limited to 20 students. Prerequisite: ILR0B 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 ILR0B 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.

ILR0B 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.

ILR0B 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.

ILR0B 4280 Blue-Collar Work in America
Spring. 4 credits. Prerequisites: ILR0B 1220. S. Bacharach and W. Sonnenstuhl.
Although America is often described as a post-industrial society, blue-collar 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.

ILR0B 4290 Organizational Politics and Institutional Change
Spring. 4 credits. Prerequisite: junior or senior standing; permission of instructor. S. Bacharach.
Examines the market, cultural, political, and structural forces behind organizational “rules of the game,” how these 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, dealmaking, rationality, uncertainty, and competition. Course requirements include completing a major research paper and leading a class discussion.

ILR0B 4700 Group Processes
Fall. 4 credits. Prerequisites: ILR0B 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 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 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. Staff.  
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 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 context that determines 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 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 proseminal seminar 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 traditions 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 MILR 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
ILRST 2100 Introductory Statistics (also BTRY 2100)

Fall, spring, and summer. 4 credits. Prerequisite: introductory algebra. L. Kams and P. Velleman.

ILRST 3110 Practical Matrix Algebra

Fall or spring. 4 credits. Staff. Matrix algebra is necessary for statistics courses such as regression and multivariate analysis and for other research methods courses in various other disciplines. One goal of this course is to provide students in various fields of knowledge with a basic understanding of matrix algebra in a language they can easily understand. Topics include special types of matrices, matrix calculations, linear dependence and independence, vector geometry, matrix reduction (trace, determinant, norms), matrix inversion, linear transformation, eigenvalues, matrix decompositions, ellipsoids and distances, and some applications of matrices.

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 6100 Statistical Methods I (also BTRY/STSCI 6010)**
Fall. 4 credits. J. Booth.
For description, see BTRY 6010.

**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 coursework equivalent to ORIE 6700.
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). A. Vidyashankar.
Comprehensive introduction to the analysis of longitudinal data. Involves three major components: a modeling component, an analysis component, and a diagnostic component. Linear and nonlinear mixed effects models are used for the modeling portion; likelihood and estimating function methodology are used for the analysis portion. Diagnostic tools for studying the validity of various assumptions are also developed. Modeling and methodology for the analysis of missing data are also incorporated in the curriculum. SAS is used extensively.

**ILRST 7990 Directed Studies**
For description, see "Collective Bargaining, Labor Law, and Labor History:"

**ILR Extension**
The following courses are open to participants in the Extension Division’s statewide credit programs in labor studies and management studies. Extension offices are based in Buffalo, Albany, Rochester, Ithaca, New York City, and Long Island. These courses are not open to undergraduate or graduate students matriculated in the Ithaca ILR programs.

Courses and course credits earned in Extension Division certificate programs are not automatically accepted as transfer credits or as a basis of admission to the resident ILR undergraduate and graduate programs in Ithaca. Student applications for course transfer are evaluated by the ILR school on an individual basis.

**2090 Leadership in Unions**
Fall or spring. 3 credits. Staff.
What role does leadership play in the vitality of the labor movement? Is there a crisis of leadership in contemporary unions? Does the political context in which a union membership organization affect the quality of leadership? Will changing workforce demographics create a demand for increased leadership opportunities by women and minorities in their unions? This course examines theories of leadership including a comparison of leadership styles and skills in the context of changing needs of the labor movement. The dynamic relationship of leaders and followers is examined in regard to emerging internal union organizing strategies that aim to increase membership and to activate current members.

**2120 Labor, Technology, and the Changing Workplace**
Fall or spring. 3 credits. Staff.
Technological changes are having a profound impact on both work and society. But what do these changes mean for workers and their unions? Is resisting technological change equivalent to obstructing progress? What can we do to influence how work is shaped and performed? These and other questions are the central concerns of this course. The course is divided into three sections: Skills, Technology, and the Labor Process; Industrial Change and Worker Responses: Four Historical Case Studies; Unions, Technology, and the Future of Work.

**2400 Union Organizing**
Fall or spring. 3 credits. Staff.
Students learn which unions are organizing successfully today and which workers are joining unions. Through case studies, discussion, and in-class exercises, they learn about targeting, house calls, building rank and file organizing committees, how to talk union, inoculating against anti-union campaigns, legal aspects of organizing, and innovative ways to organize outside of government-run certification elections.

**2410 Arbitration**
Fall or spring. 3 credits. Staff.
Study of the place and function 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 an arbitration hearing, and the preparation of an arbitration opinion.

**2420 Public Sector Collective Bargaining**
Fall or spring. 3 credits. Staff.
Introduction to collective bargaining in the public sector. Examining the historical development of bargaining in public employment, the evolution of state and federal and bargaining theory and practices, as well as impasse resolution techniques frequently found in this sector. Special emphasis is given to developing an understanding of the similarities and differences between public and private sector bargaining and how they have affected tactics and strategies employed by the parties.

**2450 Public Sector Labor Law**
Fall or spring. 3 credits. Staff.
Survey and analysis of the New York State Public Employees Fair Employment Act and compares it with other state laws covering public employees. Examines the intent to which the law protects and regulates concerted actions by employees in the public sector. The intent is to study and understand the law as written but more important to understand how it has been interpreted by the courts of New York State in its application. Major emphasis is on employee and employer rights, including recognition and certification, improper practices, strikes, grievances, and disciplinary procedures of the New York State Public Employment Relations Board.

**2470 Labor and the American Economy**
Fall or spring. 3 credits. Staff.
Helps the student understand how economic theories relate to the economic problems confronting the American citizen in general and the American union member in particular. Emphasis is placed on contemporary economic theories and how their proponents attempt to solve American economic problems.

**2480 Employment Practices Law**
Fall or spring. 3 credits. Staff.
Considers laws and regulations that directly affect managers and employers. Students examine issues and laws such as Equal Employment Opportunity, Employee Retirement Income Security Act, Federal Wage and Hour Laws, Occupational Safety and Health Act, unemployment laws, and other topics. Students focus on the practical application of laws and their impact on the workplace.

**2500 New York Workers’ Compensation Law for Trade Unionists and Injured Workers**
Fall or spring. 3 credits. Staff.
There is a collective perception that the workers’ compensation system in New York compounds an injured personal predicament with Byzantine responses that lead to despair. Unions and injured workers’ organizations believe that, if properly empowered, they can be just as effective as lawyers in looking after their injured colleagues’ claims. This course is structured to meet both of these realities. Students delve into every nook and cranny of New York Workers’ Compensation law. The course is entirely practical. Skills teaching, how to present a case, decorum, ethics, and persuasiveness are built into the course. Experts on how the system really works are used.

**2520 Contract Bargaining**
Fall or spring. 3 credits. Staff.
Examines the principles of contract bargaining, including bargaining environments and structures as well as standards used in bargaining. Students learn to prepare bargaining demands, cost economic items, draft noneconomic contract language, negotiate economic and noneconomic issues, and resolve a contract bargaining impasse. The course considers the impact of contract bargaining outcomes on workers, unions, employers, and the public.

**2530 Contract Administration**
Fall or spring. 3 credits. Staff.
Focuses on the role of the steward in administering the union contract in the workplace. Students evaluate grievance and
arbitration contract clauses, the grievance procedure in practice, the role of the union steward, the role of local and international unions, negotiation of grievances, and preparation for arbitration. Students analyze the impact of grievance and arbitration procedures on workers, unions, and employers.

2540 Labor Law
Fall or spring. 3 credits. Staff.
Examines the principles of labor law by looking at social philosophy and the historical context of federal labor legislation from the 1930s. Students concentrate on major provisions of the National Labor Relations Act, examining how the National Labor Relations Board and the federal courts have interpreted the national labor laws. Discussion includes new directions in labor legislation and interpretation with consideration given to the impact of labor law on workers, unions, and employers.

2550 Labor History
Fall or spring. 3 credits. Staff.
Reviews American labor history from the perspective of workers' social dimensions of the development of the working class, reform and revolutionary movements, and the emergence of craft, industrial, and public employee unions. Includes a discussion of the development of trade union institutions and leaders, and the evolution of union political activities and collective bargaining. Special attention is paid to the involvement of women and minority workers with unions.

2560 Dispute Resolution
Fall or spring. 3 credits. Staff.
Examines third-party participation in dispute resolution in private and public sector collective bargaining. Develops dispute resolution methods in American labor relations; issues and practices in neutral, binding arbitration of grievances and mediation; conciliation; and fact finding procedures are discussed. Use of exclusive labor-management mechanisms to settle industry disputes is also examined.

2590 Union Administration
Fall or spring. 3 credits. Staff.
Focuses on the principles and practices of effective union administration. Students study the dynamics of democratic organizations and the development of organizational leadership. The course explores alternative methods of decision making and lines of responsibility. The legal obligations of unions and union officials are discussed and analyzed. The course also examines the structure and evolution of relationships inside the labor movement.

2640 Contemporary Labor Problems
Fall or spring. 3 credits. Staff.
Survey of the major challenges that confront the American labor movement. Students are briefed on the background of each problem and discuss and analyze a broad range of solutions proposed by the experts.

FACULTY ROSTER

Abowd, John M., Ph.D., U. of Chicago.
Edmund Ezra Day Prof. of Industrial and Labor Relations.
Human Resources Economics.
Applegate, Ronald, Ph.D., SUNY Binghamton.
Bacharach, Samuel, Ph.D., U. of Wisconsin.
Jean Mckeevay-Alice Grant Prof. of Labor Management Relations, Organizational Behavior.
Batt, Rosemary, Ph.D., Massachusetts Inst. of Technology.
Alice Cook Professorship in Women and Work.
Asst. Prof., Human Resource Studies.
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.
Bolier, 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.
Collins, Christopher, Ph.D., U. of Maryland.
Assoc. Prof., Human Resource Studies.
Cook, Maria L., Ph.D., U. of California.
Daniel, Cletus E., Ph.D., U. of Washington.
Prof., Collective Bargaining, Labor Law, and Labor History.
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 Economics.
Freedman, Matthew, Ph.D., U. of Maryland.
Asst. Prof., Labor Economics.
Givan, Rebecca K., Ph.D., Northwestern U.
Goncalo, Jack, Ph.D., U. of California.
Berkeley. Asst. Prof., Organizational Behavior.
Gross, James A., Ph.D., U. of Wisconsin.
Prof., Collective Bargaining, Labor Law, and Labor History.
MANAGEMENT

ADMINISTRATION
L. Joseph Thomas, dean
Mark Nelson, associate dean for academic affairs
Douglas Stayman, associate dean for curriculum
Cathy S. Dove, associate dean for M.B.A. Program and 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 Szprio, director of Boardroom Executive M.B.A. Program
Randall Sawyer, director of admissions
Karim S. Ash, director of career services
Deniqua Crichlow, director of Office of Diversity and Inclusion
Ann W. Richards, financial aid director and associate director of admissions
Rhonda H. Velazquez, director of student activities and special events
Kerrin-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. See the Johnson School web site: www.johnson.cornell.edu/academic/courses/ for information on enrollment and a complete course roster.

UNDERGRADUATE ONLY

NBA 3000 Entrepreneurship and Enterprise
Fall, spring. 3 credits. Prerequisite: non-Johnson School students. Johnson School students, see NBA 5640. D. Ben-Daniel. Uses Cornell-developed case studies and lectures to address entrepreneurial management in start-up ventures and new-business development in existing companies. Topics include valuation of business, planning, obtaining resources, management of growth, and cashing out. Guest lecturers speak on specialized topics such as corporate and patent law, bankruptcy and workouts, leveraged buyouts, and valuations of businesses. Students team up to write and present business plans. The course attempts to integrate marketing, finance, operations, and human-resource topics in the context of high-growth business ventures.

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. Designed for mentored independent study, this course uses streaming video, guest speakers, distance learning, and special lectures/tutorials. There is no homework and few required class meetings. Work is focused on one project. Students form a start-up team, choose a technical business idea, and develop and found a business that can attract venture investors. Tutorial sessions with instructors apply lessons to the team business plan. Students learn how high-technology ideas are converted into world-class businesses in venture-backed start-up companies and in new business development in existing companies. Slides take the student from idea to initial public offering. Grading is based on a final exam focusing on the video lectures, a written business plan, and its final presentation to a judging panel.

NBA 5150 Leadership Theory and Practice
Fall, spring. 3 credits. M. Hostetter. 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 Analysis for Engineers
Spring. 3 credits. Prerequisite: non-Johnson School students. J. D’Souza. 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
Fall, spring. 3 credits. Prerequisite: non-Johnson School students. Similar in content to M.B.A. core course NCC 5040. Staff. Takes a resource-based approach to management by arguing that organizations should link their strategy to their internal resources and capabilities. Develops this theme by addressing (1) the strategic value of internal resources and capabilities; (2) the role of human resources and organizational behavior in formulating and implementing strategy; and (3) the importance of structure and the design of organizations in formulating and implementing strategy. Topics include how firms create sustainable competitive advantage through internal resources and capabilities; best practices for managing
people; effects of best practices on attitudes and behaviors; why putting the customer first is not necessarily best practice from a resource-based perspective; why organizational culture is central to organizational effectiveness; why the formal organizational chart and structure of an organization are important; how organizations innovate; how organizations change through re-architecture and re-engineering; what firms gain and lose through pursuing core competencies; and what firms gain through strategic alliances and networks. The course makes extensive use of case materials.

**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 management, the capital allocation process and 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 5590 Strategy**

Spring. 3 credits. 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 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 immersions 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 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 pursuing 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

**SBM—Immersion in Brand Management**

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

NCC COMMON CORE COURSES

NCC 5000  Financial Accounting
Fall. 2.5 credits. Johnson School core course. Limited enrollment. 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. Introduction to decision making under conditions of uncertainty. Topics include descriptive statistics, probability theory, classical statistics, statistical decision theory, and simple and multiple regression analysis. Applications in finance, marketing, and operations management are discussed.

NCC 5020  Microeconomics for Management
Fall. 2.5 credits. Johnson School core course. Limited enrollment. R. Frank. 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. S. Botti and E. Eisenstein. 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. K. O'Connor and S. Spatara. 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 story-telling—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 business, and (2) to develop and refine students' analytical story-telling 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. Letter grades only. 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. 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. Queueing 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, inventory management, and just-in-time and logistic management. Constrained optimization models

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 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

EGE—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.
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. V. Kadiyali and J. Johnson.

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.

Based on the essential concepts and terminologies of financial accounting introduced in the accounting core course. Students learn to evaluate financial statements through the use of case studies drawn from actual corporate financial reports.

**NBA 5010 Taxes and Business Strategy**  
Spring. 1 credit. Prerequisites: NCC 5000 and NCC 5060. Staff.

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, acquiring 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.

**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. Topics include budgeting, accumulating costs for product costing, activity-based costing, standard costs, the analysis of cost variances, cost estimation and prediction, cost-price-volume decisions, performance measurement, nonmanufacturing costs, 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, a project, and class participation.

**NBA 5030 Strategic Cost Management**  
Fall. 1.5 credits. R. Hilton.

Focuses on the role of cost management and related issues in helping a firm compete successfully in the global market. Topics include activity-based costing, activity-based management, value chain analysis, the lean enterprise, confronting competition in an industry dominated by lean enterprises, re-engineering, process value analysis, identification of non-value-added activities and costs, target costing, Kaizen costing, continuous improvement, time-based competition, cost versus quality, and benchmarking. The course is based almost entirely on cases, many of them lean enterprises in Japan.

**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. There is an exam.

**NBA 5090 Advanced Financial Analysis**  
Fall. 1.5 credits. Prerequisite: 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 equity valuation, residual income models, quality of earnings assessments, earnings manipulation detection, market efficiency issues, fairness opinions in MBOs, and large-sample stock screening strategies. The overall focus is on using accounting-based information to make investment decisions. Emphasis is on practical applications, and special attention is given to cultivating communication skills. Features both lectures and cases. There is a group term project but no final exam.

**NBA 5110 Financial Modeling**  
Fall, spring. 1.5 credits. Prerequisites: NBA 5060 or permission of instructor; mastery of basic Excel skills. C. Nichols and J. O’Young.

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.

#### Economics

**NBA 5240 Macroeconomics and International Trade**  
Fall. 3 credits. Prerequisite: NCC 5020 or equivalent or permission of instructor. O. Heffetz.

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 Price Theory**  
Spring. 4 credits. R. Frank.

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 analysis 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**  
Fall. 1 credit. F. Keller.

The goal of this course is to provide students with an understanding of how entrepreneurial business professionals use sustainability principles as drivers for innovation. By examining and comparing current writings with the experiences of the instructor’s company, Catalyst Engineering, and guest speakers from DuPont and Herman Miller, students will draw conclusions about how they can incorporate such strategic thinking into their own career paths. Students will learn that in addition to traditional strategic financial analysis, business decisions do benefit from taking into account the impacts of social and ecological capital. As well, the classroom and discussions will demonstrate that this “Triple Bottom Line” approach is an effective catalyst for organizational innovation, particularly in emerging enterprises. Students will gain a foundation in the underlying principles of sustainability in business and engage in a dialogue to debate the barriers and challenges of applying sustainable principles in an entrepreneurial context. Resources will include reading from *The Natural Step for Business* by Nattrass and Altomare, *Natural Capitalism* by Hawken, Lovins, and Lovins, and *Mid Course Correction* by Ray Anderson.

**NBA 5300 Entrepreneurship Lab**  
Fall, spring. 1.5 credits. O. Bengtsson.

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 discussions and 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.
Focuses on the industry 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; and (3) issues in private equity investing such as concentration in fewer, larger funds and the critical role of a new class of gatekeeper/consultants for limited partners. Involves four lectures and a final paper.

NBA 5630 The IPO Process and Deal Structure Alternatives
Fall, 3 credits. J. Nozell and J. Teitelbaum.
Studies an in-depth look at initial public offerings and deal structures from a practitioner’s perspective. 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 transaction, such as caps/collars, letters of intent, successor liability, continuity of employees, and noncompetition agreements.

NBA 5640 Entrepreneurship and Private Equities
Fall, spring, 3 credits. D. BenDaniel and O. Bengtson.
Uses Cornell-developed case studies and lectures to address entrepreneurial management in start-up ventures and new-business development in existing companies. Topics include valuation of business, planning, obtaining resources, management of growth, and cashing out. Guest lecturers speak on specialized topics such as corporate and patent law, bankruptcy and work-outs, leveraged buy-outs, and valuations of businesses. Students team up to write and present business plans. The course attempts to integrate marketing, finance, operations, and human-resource topics in the context of high-growth business ventures.

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
Fall, 1.5 credits. Prerequisites: NBA 5640, 3000, 401, or permission of instructor. J. Bartlett and D. BenDaniel.
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 (in both bull and bear market environments), (4) understanding capitalization structures (e.g., common stock, preferred stock, warrants), (5) using stock options as employee incentives, (6) fundamental fair employment practices, (7) proper establishment and use of boards directors and advisory boards, (8) technology licensing and commercialization, (9) negotiating relationships with distributors, resellers, and customers, (10) the Foreign Corrupt Practices Act, and (11) dealing with creditors.

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 5210 Investing in Distressed Corporations
Fall, 1 credit. J. Rubin, R. Symington, and J. Hass.
Focuses on the burgeoning practice of investing in distressed companies. Once a backwater, this $680 billion (face amount) field of finance is now a “must have” in virtually all institutional portfolios. In 2001 alone, $63 billion of additional defaults entered this universe, with 2005 high inflows projected for the next few years. Corporate reorganization finance techniques are now necessary tools for individuals in a variety of other disciplines, as it is now highly likely that finance professionals and managers encounter distressed situations in their careers. Using a “bottoms-up” approach, the curriculum first seeks to develop the building blocks of this field: research, valuation, legal issues, and strategies. Issues such as target capital structure location, control/passive strategies, value creation through reorganizations/liquidations, and new/old mortgage plans are explored. These principles are then applied to real-world situations using case studies.

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 5420 Investment and Portfolio Management
Spring, 3 credits. Prerequisites: NCC 5010, 5020, and 5060. Comfort with quantitative methods. G. Saar.
Deals with several important issues pertaining to investments in securities markets. Covers (1) portfolio diversification theory, asset allocation, asset pricing models (e.g., CAPM and APT), and empirical anomalies such as size effect and January effect; (2) the issue of evaluating portfolio performance and mutual fund performance; (3) investment strategies based on patterns in historical security returns (may be loosely considered technical analysis); (4) investment strategies based on publicly available information related to accounting and other market statistics and the use of earnings forecasts (may be considered as fundamental analysis); (5) frictions to trading imposed by the institutional structure of securities markets. The goal of this course is to train students in the latest tools and techniques in portfolio theory and familiarize them with the latest developments in securities market research and applications. This is a highly quantitative course involving extensive analysis of security market data using regression analysis and other statistical tools. Grades are based on midterm and final exams, cases, a project, and a trading game.
NBA 5430 Financial Markets and Institutions
Fall, spring. 3 credits. Prerequisite: NCC 5060 (finance core). W. Bailey.
Applies principles of finance to understand market behavior. 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. Real 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 5520 Cases in Corporate Finance
Fall. 3 credits. Prerequisites: second-year MBAs and Twelve-Month Option (TMO) students, NCC 5060 or equivalent. Staff.
We will develop an understanding of the theories of corporate finance and have discussions of the following: financial distress, 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 an ability to analyze the financing decisions of corporations.

NBA 5540 International Finance
Spring. 3 credits. Prerequisite: NCC 5060 (finance core) 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 of these 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 (finance core), NCC 5010 (statistics core). R. Jarrow.
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 5560 Corporate Financial Policy
Fall, spring. 1.5 credits. Prerequisite: NCC 5060 (finance core). 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 claimants 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 5580 Corporate Governance
Spring. 1.5 credits. Prerequisites: NCC 5060 and NBA 6560 or permission of instructor. Y. Grinstein.
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 a career in M&A/investment banking, financial management, or consulting firms.

NBA 5600 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 to an analysis of investor psychology to understanding China's financial market.

NBA 5650 Advanced Valuations
Fall. 1.5 credits. Prerequisite: IBI immersion or written permission of instructor. Staff.
Builds on the valuation principles course. Applies discounted cash flow (DCF) valuation and valuation by multiples using comparables to multinational contexts. Considers mergers and acquisitions, and multinational project and firm valuations, from the viewpoint of a U.S. manager. Discusses issues such as differences in parent and project cash flows, accounting differences, exchange risks, political risks, and valuation in developing countries. Examine the contingent claims valuation approach, with emphasis on flexibility in managerial decision-making. Focuses on the valuation of strategic options, growth options, and flexibility in capital investments using traditional and nontraditional option pricing techniques. Discusses valuation of growth options, expansion options, natural resource investments, land development, R&D, young-high-growth companies, etc., using the Black-Scholes option pricing model and its variants. Grading is based on cases, a valuation project involving a foreign company, and a final exam.

NBA 5660 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 from financial and technical 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 leveraging 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 6420 Introduction to Derivatives, Part 1
Fall. Spring. 1.5 credits. Prerequisite: NCC 5060 (finance core) 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 6420 Introduction to Derivatives, Part 2
Fall. 1.5 credits. Prerequisite: NCC 5060 (finance core) 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
General Management

NBA 5370 Information in Markets
Spring. 1.5 credits. R. Bloomfield.
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, real property, and landlord-tenant concerns. Uses text readings and case studies.

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, real property, and landlord-tenant concerns. 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. 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. 7 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 (impromptu, extemporaneous, manuscript), delivery, organization, visual aids, and question/answer. Student speeches constitute the bulk of class time, with each student presenting seven or eight speeches. The small class size allows for significant individual attention. Students receive feedback from classmates and the instructor, and have the opportunity to review in tutorials the videotapes of most of their presentations.

NBA 5690 Management Consulting
Fall. 3 credits. A. McAdams. Case study–oriented course focusing on strategic consulting. Objectives are to (1) provide students with the opportunity to understand the consulting environment and for them to gain indirect experience in that role through dealing with a broad range of practical and real-world issues; (2) help students improve their analytic skills through practice with case material; (3) provide students with information that they are unlikely to gain in other courses, as well as experience in making group presentations and evaluating them. Students are required to write a comprehensive analytic term paper.

NBA 5700 Leadership in Management
Spring, five-day training sessions. 1 credit. attendance required at each day of course to receive credit. Prerequisite: M.B.A. students. P. Stepp, RPW Executive Development, and other Johnson School faculty. Partnership with RPW Executive Development to provide M.B.A. students with the self-awareness and interpersonal skills required to be effective leaders (the general principles of leadership course in NBA 5600). The first two days focus on self-awareness and employ several experiential exercises and self-assessment instruments, including the Campbell Leadership Index (CLI), Myers-Briggs Type Indicator (MBTI), the Fundamental Interpersonal Relations Orientation-Behavior (FIBO-B), the Kerth Adaptation/Innovation inventory (KAI), and the Ambiguity Preference Scale (APS). Students are also trained in giving and receiving feedback to team members and faculty. Midweek activities consist of various leadership and team challenges, including a business simulation. Note: Most of the self-assessment instruments listed above need to be completed before the first day of class to allow for scoring and analysis.

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. Letter grades only. S. Smidt. This computer-based simulation is played by self-selected teams of four students who make marketing, production, and financial 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 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 Scientists and Technologists
Fall 3 credits. Prerequisite: accelerated MBA (AMBA) students. 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 centers 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 Projects
Spring. 3 credits. R. Allen. Designed to apply consulting processes to real business projects. Students form consulting teams focused on specific strategic, process improvement, or operational problems in companies. A faculty member and the consultant in residence (CIR) advisors, are closely engaged in the teams’ work. The teams meet with the faculty advisors weekly. Sessions focus on cross-team learning about the application of the consulting process to a variety of consulting engagements. The faculty advisor and/or CIR also meet as needed with each team to work through real-time issues presented by each consulting project. Projects include local small-business clients, not-for-profits, Big Red Incubator, and large national and multinational companies. At the end of the project, each student and team receive 360-degree feedback from the faculty advisor, CIR, the client, and other team members.

NBA 5780 Consulting Process
Fall, spring, half semester. 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 client/consultant 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 General Electric 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 5670 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 biggest 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 5720 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 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.

International Management

NBA 5341 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 5840 International Political Risk Management
Spring. 1.5 credits. E. Iankova. When investments remain domestic political risks are easier for executives to understand and manage. International business opens executives to new forms of risk and to risks that are less well understood. New political cultures, government instability, unpredictability in local tax and regulation regimes, corruption, civil unrest, globalization of trade and economic integration, increasing power of transnational social movements, and international business have raised new challenges to foreign investors, and have demanded new management strategies. The aim of this course is to introduce students to the political risks involved in international business operations and to develop students’ general understanding of the field of international political risk analysis and management. The course focuses on the various techniques used by risk assessment agencies in their attempt to assess and analyze political risks on a global scale, and on the various strategies used by foreign investors in their attempt to manage political risks. Through a combination of readings, lectures, and case discussions, the course further intends to develop practical skills in evaluating and assessing political risk on a global scale.

NBA 5840 Strategies for Global Competitiveness
Fall. 3 credits. Can be used to fulfill strategy requirement. A. Mcc. 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 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 new emergent countries such as Singapore. Classes are run in a discussion format.

NBA 5840 International Competitive Strategy
Fall and spring. 1.5 credits. J. Katz. 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 credits. J. Hanks. Addresses the principal business and legal issues in cross-border mergers and acquisitions, and techniques of combining two businesses, negotiation, pricing and other economic terms, due diligence, issuance of securities, antitrust duties of managers and 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. Katz. 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, decision-making, and human resource management.

NBA 5890 Business in Transition Economies
Fall, half semester. 1.5 credits. E. Iankova. Explores business development and strategy in the transition economies of central and eastern Europe, Russia and the Commonwealth of Independent States, and China. Traces the divergence in the processes of political democratization and economic restructuring, with a special emphasis on marketization, liberalization, and privatization issues. Specifically examines the emergence and consolidation of new business organizations in the course of economic restructuring, as well as foreign investment trends and foreign investors strategies in various transition economies. More specific issues of entrepreneurship, management restructuring, marketing, enterprise employment relations and human resource management, as well as the impact of culture are also discussed. focuses on better the pressures for change in the transition economies in their complexity and entirety, students become personally involved in case discussions of organizations and ventures operating in different transition countries and sectors of the economy.

NBA 5910 Experience in International Management
Fall, spring. 1.5 credits. Fee charged for required faculty-approved study trip. G. Katz. 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 (1 1/4 hours each) and two Saturday 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. M. Goldman.
Venture capital firms, corporate venture funds, and “angels” have increased their financing in high-growth start-up activities outside of their country of origin. This course provides an overview of the diffusion of entrepreneurship institutions outside of the United States via traditional forms of start-up finance (i.e., family backing, intrapreneurship). It also focuses on the process of selecting, financing, managing, and exiting venture capital deals abroad. The course is designed to provide practical insights through the participation of guest speakers involved in various stages of international entrepreneurship activities (e.g., European corporate funds in the United States, venture capital firms in Europe, U.S.-based venture capital, and “angel” initiatives investing abroad).

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 labor 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. 1.5 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 crisis 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, half semester. 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 “new” 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. J. Katz.
Students will be trained to think about doing business abroad. The course is designed to provide practical insights through the participation of guest speakers involved in various stages of international marketing activities (e.g., European corporate funds in the United States, venture capital firms in Europe, U.S.-based venture capital, and “angel” initiatives investing abroad).

NBA 6420 Global Corporate Citizenship
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 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; students 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 The Business of Biotechnology: Taxonomy and Analysis
Spring. 1.5 credits. B. Ganem.
Breakthrough scientific discoveries in biotechnology will continue to drive medical advances in the new millennium. As it now enters the post-genomic era, the field of biotechnology comprises some 1,400 U.S. companies having $13 billion in worldwide sales and $10 billion in research expenditures. This broad spectrum of biotech businesses presents numerous challenges to professional securities analysts attempting to track progress and map future growth in this sector. This course introduces JGSM students to the main scientific advances in modern biotechnology and life sciences research, with the dual goals of developing new organizational models of this corporate sector and helping students perform financial and business evaluations of current and emerging technologies more effectively.

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. 3 credits. Priority given to students with technology and science backgrounds. Prerequisite: working knowledge of computers. D. Greenberg.

Managers as problem-solvers face the challenge of developing and implementing new technologies. The challenge grows in complexity as these technologies are employed in more areas of our lives. Even after a technological process is fielded, its effects on businesses, consumers, and societies are often unforeseen, resulting in new problems for managers to resolve. This course examines the role of technology in business. The five-day course begins by exploring how management and leadership process change in response to new technologies. This is followed by a discussion of the role of technology 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.

Leadership is a key ingredient in a company's success. This course focuses on principles for successfully leading teams and organizations. The personal development course (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 create 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. Priority is given to MBAs.

NBA 6700 Perspectives on Leadership
Fall. 1.5 credits. D. Radcliffe.

What is leadership? What are its recognized styles? What skills and personal attributes are associated with these leadership styles? How are leadership traits and abilities manifested in different organizations and social environments? This course considers these and other questions on leadership. Most class sessions are discussions of cases comprising excerpts from classic texts in literature, politics, and philosophy. Each case also includes both a contemporary article exemplifying themes found in the classic work and a brief note on leadership theory. The course begins by examining Louis Gerstner's leadership in IBM's major turnaround in the early 1990s. This case serves as a frame of reference for examining two recent contributions to leadership studies: Daniel Goleman's research on emotional intelligence and Howard Gardner's cognitive approach to leadership. The final paper invites students to work out their own views on leadership.

NBA 6630 Managerial Decision Making
Fall. 3 credits. J. Russo.

Managers are decision-makers. They face decisions that require them to apply scientific information to strategic and operational problems, and they must make decisions in the face of uncertainty and deadlines. This course examines the managerial decision-making process, and explores some of the methods that can be used to make better decisions. The course is divided into two parts: an introduction to decision analysis and modeling in general, and an introduction to specific decision-making models and techniques. The course is designed to provide managers with a working knowledge of these techniques and with an appreciation of the limitations of these techniques.

NBA 6640 Negotiations
Fall, spring. 3 credits. M. Thomas-Hunt.

Judgment is the art and science of transforming a conflict over 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 6710 Business Ethics
Fall, spring. 1.5 credits. D. Radcliffe.

Organizations are driven by ethical values and practices. Managers who understand the ethical values that guide their organizations are better able to make ethical decisions. This course teaches students to analyze their own ethical decision-making processes, and to develop an understanding of the ethical decisions that managers are likely to encounter in their careers. The course is divided into two parts: an introduction to ethical decision-making and an introduction to specific ethical issues. The course is designed to provide managers with a working knowledge of these techniques and with an appreciation of the limitations of these techniques.

Marketing

NBA 6200 Marketing Research
Spring. 3 credits. Prerequisites: NCC 5010 and 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 Marketing Communications
Fall. 1.5 credits. Prerequisite: NCC 5030 (marketing core). S. P. Raj.

Designed to give students an understanding of the advertising and promotion management process. Covers the components of a successful advertising campaign and helps students develop an appreciation of the issues involved in advertising planning and decision making. They also learn how recent social science findings and theory can facilitate advertising management.

NBA 6220 Marketing Strategy
Fall. 3 credits. Prerequisite: NCC 5030 (marketing core). V. Rao.

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 is designed to give students opportunities to learn about the theoretical and applied perspectives of marketing strategy from readings, case analyses, and guest speakers.

NBA 6260 Consumer Behavior
Fall. 3 credits. S. Botti.

Topics include factors that influence response to advertising of various kinds, purchase decisions, product promotions, response to promotion, consumer satisfaction, and the basic methodologies for understanding consumer behavior.
NBA 6340 Consumer Relationship Management
Spring. 3 credits. Y. Park.
The course is aimed at managers who are interested in pursuing activities in customer relationship management (CRM) built around the notion of customer-centric marketing. The principal objectives of the course are to emphasize how CRM can help accomplish strategic marketing initiatives and improve firm profitability, to develop essential skills using the statistical software, and to implement strategic initiatives in CRM.

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, 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.

DOCTORAL SEMINARS
NRE 5010 Doctoral Seminar in Capital Markets Accounting Research
Spring. 1.5 credits. N. Yehuda.
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).

NMI AND NRE RESEARCH AND ADVANCED STUDIES
NMI 5000 Directed Reading and Research
Fall, spring. 1–3 credits. Prerequisite: approval of advisors and faculty members involved in research. Staff.
Students undertake special-interest research under the supervision of faculty members.
NMI 5030 Six-Sigma Quality and Process Improvement Methodology
Spring. 1.5 credits. Staff.
This course will cover the main parts of the Six-Sigma Quality and Process Improvement Methodology. Topics include data analysis, project management, design of experiments, other statistical methods, and the application of those techniques to quality and process improvement. The course will cover all of the preparation for what is called "Green Belt Certification," an industry standard certification that normally requires 80 classroom hours.
The course will include methods for managing a quality improvement project, with several examples.

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 registering 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 (304 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).
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.

NRE 5370 Doctoral Seminar in Global Business

Spring. 1.5 credits. J. Katz.

**FACULTY ROSTER**

Bailey, Warren B., Ph.D., U. of California, Los Angeles. Assoc. Prof., Finance

BenDaniel, David J., Ph.D., Massachusetts Inst. of Technology. Don and Margi Berens Professor of Entrepreneurship

Bengtsson, L. Ola, Ph.D., U. of Chicago. Asst. Prof., Finance and Entrepreneurship

Bhojraj, Sanjeev, Ph.D., U. of Florida. Asst. Prof., Accounting

Bierman, Harold Jr., Ph.D., U. of Michigan. Nicholas H. Noves Professor of Business Administration

Bloomfield, Robert J., Ph.D., U. of Michigan. Assoc. Prof., Accounting

D’Souza, Julia, Ph.D., Northwestern U. Assoc. Prof., Accounting


Fanahat, Anno A., Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Operations Management

Frank, Robert, Ph.D., U. of California, Berkeley. Prof., Economics

Gavirneni, Srinagesh (Nagesh), Ph.D., Carnegie Mellon U. Asst. Prof., Operations Management

Grinstein, Yaniv, Ph.D., Carnegie Mellon U. Asst. Prof., Finance

Gupta, Sachin, Ph.D., Cornell U. Assoc. Prof., Marketing

Hart, Stuart, Ph.D., U. of Michigan. Samuel C. Johnson Chair in Sustainable Global Enterprise; Prof., Management

Hass, Jerome E., Ph.D., Carnegie-Mellon U. James B. Ruben Professor of Finance, Krane Faculty Fellow

Heffetz, Ori, Ph.D., Princeton U. Asst. Professor of Economics

Hilton, Ronald W., Ph.D., Ohio State U. Prof., Accounting

Huang, Ming, Ph.D., Stanford U. Professor of Finance

Huttonlocher, Daniel P., Ph.D., Massachusetts Inst. of Technology. John P. and Rilla Sears Professor, Computing and Information Systems and Business

Iken, Alice M., Ph.D., Stanford U. S. C. Johnson Professor, Marketing

Jarow, 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. Asst. Prof., Economics

Kadiyali, Vinod, Ph.D., Northwestern U. Assoc. Prof., Marketing and Economics

Khessina, Olga M., Ph.D., U. of California, Berkeley. Asst. Prof., Management & Organizations

Cornell U. Prof., Accounting and Finance, Henrietta Johnson Louis Professor of Management; Director, The Park Center for Investment Research

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 Behavioral Science

Manmik, Elisabeth A., Ph.D., U. of Chicago. Assoc. Prof., Management and Organizations

McAdams, Alan K., Ph.D., Stanford U. Prof., Managerial Economics

McClain, John O., Ph.D., Yale U. Prof., Operations Management

Michaela, Roni, Ph.D., New York U. Prof., Finance

Nelson, Mark W., Ph.D., Ohio State U. Prof., Accounting

Nichols, D., Ph.D., Indiana U. Asst. Professor of Accounting

O’Connor, Kathleen, Ph.D., U. of Illinois. Assoc. Prof., Management and Organizations

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


Saar, Gideon, Ph.D., Cornell U. Asst. Professor of Finance

Schneider, Henry S., Ph.D., Yale U. Asst. Prof., Economics

Sine, Wesley, Ph.D., Cornell U. Asst. Prof., Management and Organizations

Spataro, Sandra F., Ph.D., U. of California, Berkeley. Asst. Prof., Management and Organizations

Stayman, Douglas M., Ph.D., U. of California, Berkeley. Assoc. Prof., Marketing

Swaminathan, Bhaskaran, Ph.D., U. of California, Los Angeles. Assoc. Prof., Finance

Swieringa, Robert J., Ph.D. U. of Illinois. Prof. of Accounting

Thomas, L. Joseph, Ph.D., Yale U. Anne and Elmer Lindseth Dean, Prof. of Manufacturing Management, Mano K., Ph.D., New York U. Asst. Prof., Marketing

Thomas-Hunt, Melissa, Ph.D., Northwestern U. Asst. Prof., Management and Organizations

Waldman, Michael, Ph.D., U. of Pennsylvania. Prof., Economics; Charles H. Dyson Professor, Management

Weinbaum, David Ph., New York U. Asst. Prof., Finance

Yang, Nan, M.S., Columbia U. Asst. Prof., Operations Management

Yehuda, Nir, Ph.D., Columbia U. Asst. Professor of 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

Bilosi, Alan J. Ph.D., Cornell U. Lec., Finance

Iankova, Elena A., Ph.D., Cornell U., International Finance

Katzenstein, Gary, Ph.D., Carnegie Mellon U. Sr. Lec., Global Business and Management and Organizations

Måste, Mark B., Ph.D., U. of North Carolina. Lec., Sustainable Global Enterprise

Mink, Barbara E., M.A., Cornell U. Sr. Lec., Management Communications

Noble-Grange, Angela P., M.B.A., Cornell U. Lec., Management Communications

Nozell, John D., M.B.A., Cornell U. Sr. Lec., Finance

Rosen, Charlotte, Ph.D., Cornell U. Sr. Lec., Coordinator, Management Communications

Shulman, Zachary J., J.D., Cornell U. J. Thomas Clark Senior Lecturer of Entrepreneurship and Personal Enterprise, Sr. Lec., Entrepreneurship


**Adjunct and Visiting Faculty**

Azis, Iwan J., Ph.D., Cornell U. Prof., Economics

Fitzgerald, Eugene, Ph.D., Northwestern U. Visiting Prof., Management

Greenberg, Donald P., Ph.D., Cornell U. Prof., Management Information Systems

Grossman, Dale A., J.D., American U. Sr. Lec., Tax and Business Law

Janosi, Tibor, Ph.D., Massachusetts Inst. of Technology. Visiting Prof., Finance

McLeod, Poppy, Ph.D., Harvard U. Adjunct Assoc. Prof., Management Communications


Raj, S. P., Ph.D., Carnegie Mellon U. Adjunct Prof., Marketing
ADMISSION

Stewart J. Schwab, Dean and Professor of Law
Barbara J. Holden Smith, Associate Dean for Academic Affairs and Professor of Law
Claire M. Germain, Law Librarian and Professor of Law
Richard D. Geiger, Associate Dean and Dean of Admissions and Financial Aid
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. Crampton, Assistant Dean for Graduate Legal Studies
John R. DeRosa, Assistant Dean for Student Services

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'Études 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
Fall year. 6 credits. Letter grades only.
K. M. Clermont, J. J. Rachlinski, 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.
A study of basic American constitutional law, including judicial review, some structural aspects of the Constitution as developed particularly in light of the passage of the Civil War amendments, and certain of its rights provisions.

LAW 5041 Contracts
Fall year. 6 credits. Letter grades only.
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.
Lawyering is 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, students write predictive memoranda that point out the strengths and weaknesses of their client's case. 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
Fall. 4 credits. Letter grades only.
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
Spring. 4 credits. Letter grades only.
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. Limited enrollment. Graduate program grading—H, S, U. Limited to graduate students. P. G. Court and M. M. Morrison.
This course introduces LL.M. students to basic legal research in U.S. materials that will be valuable to them at Cornell and in practice. The focus is 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. Instruction will largely use online materials most likely to be available to the students in their future careers. There are short introductory lectures, as well as hands-on computer lab and Reading Room sessions. Students complete five assigned exercises using the resources learned in class, and there is no final exam. The final grade is based on the five assigned exercises (20% each).

LAW 6221 Anglo-American Contract Law and Related Obligation
Fall. 4 credits. Limited to graduate students. Graduate program grading—H, S, U. R. A. Hillman.
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. Graduate students who wish to study contract law would generally be expected to take this one-semester course. They are free to enroll in the first-year Contracts course, but if they do so, they must take that course for the full year.
LAW 6761  Principles of American Legal Writing  
Fall, spring. 2 credits. Limited enrollment. Limited to graduate students. Graduate program grading—H, S, U; L. Knight. This course introduces foreign-trained lawyers to the American legal system and essential principles of legal writing in the United States. Students have an opportunity to practice some of the forms of writing common to American legal practice, by drafting documents such as client letters, memoranda, and briefs, in the context of representing hypothetical clients.

LAW 7991  The Cornell Graduate Colloquium  
Spring. 3 credits. Limited enrollment. Satisfies writing requirement. Required for all first-year J.S.D. candidates. Open first to L.L.M. students and then to J.D. students to extent that places are available. Visiting scholars and exchange students from foreign institutions highly encouraged to attend in an unofficial capacity. J.S.D. and L.L.M. program grading—H, S, U; J.D. program. Letter grades only. Instructor TBA.

Course in advanced academic research methodology. It is designed to prepare the students to engage in doctoral-level research, analysis, and writing, especially in comparative and international contexts. The early portions of the course 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 present and critique their methodologically reflective research projects. External speakers present their work in progress for the purposes of generating methodologically oriented discussion.

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. Intended primarily for students with little or no background in bookkeeping or accounting. Limited to students with no more than 6 credit hours of accounting (or its equivalent) or permission of instructor. S–U or letter grades. R. A. Sarachan.

This course introduces students to the basic concepts and fundamentals of financial accounting. It focuses on (1) accrual accounting concepts, principles, and conventions, (2) the presentation of financial statements, (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.

LAW 6011  Administrative Law: The Law of the Regulatory State  
Fall, spring. 3 credits. Limited enrollment. Letter grades only. Fall, C. R. Farina; spring, J. J. Rachlinski. 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 policy-making, 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 6051  Advanced Legal Research in Business Law  
Spring. 7 weeks of term. 1 credit. Limited enrollment. Prerequisite: Lawyering or Advanced Legal Research: U.S. Legal Research for LL.M.s. Letter grades only. J. M. Callihan.

This course exposes students to online resources providing company information and enables them to evaluate the information to determine whether the resource is the most appropriate for their research. Students learn how to find what the company says about itself, what regulators say about the company, and what third parties say. The course also touches on transnational research and industry benchmarks. Classes are short lectures followed by online sessions using business databases. There are assigned readings in lieu of a required textbook, five assignments, and a short due diligence report (5 or so pages) on a company of the student's choice. There is no final exam.

LAW 6061  Advanced Legal Research—International and Foreign Law  
Fall. 2 credits. Limited enrollment S–U or letter grades. T. W. Mills.

Globalization has led to the internationalization of the practice of law. This course provides an overview of research methods, and strategies for international and foreign law. Topics include both public and private international law, the European Union, and the United Nations. The course includes lectures followed by computer lab and library training sessions. Selected readings are available online and on reserve; there is no required textbook. There are seven assignments of equal weight on material covered in class, but no final exam.

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 interact with animals. Grade will be based on participation in open-minded discussions and a paper.

LAW 6091  Animal Rights  

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 6101  Antitrust Law  
Fall. 3 credits. Letter grades only. G. A. Hay.

The antitrust laws seek to ensure that mergers and acquisitions do not create, enhance, or facilitate the exercise of market power, thereby giving one or more firms the ability to raise prices above competitive levels. Recent merger cases are used to cover many of the topics in this course, some of which include the federal government's merger review process, market definition and measurement, competitive effects (both coordinated and unilateral effects), maverick firms, merger defenses and efficiencies, joint ventures, and judicial relief and remedies in merger litigation.

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 (formerly Corporations)  
Fall, spring. 4 credits. Limited enrollment. S–U or letter grades. Fall, C. K. Whitehead; spring, R. C. Hockett.

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 is 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 include basic fiduciary obligations, shareholder voting rights, shareholder suits, corporate control transactions, and insider trading. We also devote some attention to closely held corporations and other business forms.

LAW 6161  Comparative Law: The Civil Law Tradition  
Fall. 3 credits. S–U or letter grades. M. Lassen.

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 therefore provides 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.
This course focuses primarily on the choice-of-law methods used by courts in the United States to resolve conflicts of 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 are treated less extensively.

**LAW 6231 Copyright**

Spring. 3 credits. S–U or letter grades. B. M. Frischmann.

This course focuses on U.S. copyright law and provides a survey of the main doctrinal areas including the definition of authorship, the criteria and scope of protection, infringement including the definition of authorship, the establishment clause of the First Amendment are treated less extensively.

**LAW 6241 Corporate and White Collar Crime**

Fall. 3 credits. S–U or letter grades. S. P. Garvey.

This course examines some of the principal statutes used to prosecute corporate and white collar crime. Theories of liability considered include traditional white collar offenses like mail and wire fraud, insider trading, false statements, jury, and obstruction of justice. They also include more recent entries into the field such as RICO, money laundering, and laws enacted to combat government contract fraud. In addition, the course provides an introductory look at the workings of the now-adoptive Federal Sentencing Guidelines.

**LAW 6261 Criminal Procedure I**

Fall. 3 credits. S–U or letter grades. J. H. Blume.

This course surveys the law of criminal procedure, with emphasis on the constitutional requirements that regulate the pretrial stage of the criminal process. More specifically, it focuses on the law of interrogations and confessions, the admissibility of evidence, and the right to counsel throughout all stages of the criminal process.

**LAW 6282 Cyberlaw: Policy and Jurisdiction in the Information Age**

Fall. 3 credits. S–U or letter grades. B. M. Frischmann.

This course surveys evolving legal frameworks governing the Internet and examines the extent to which familiar legal doctrines can and should be stretched to cover the online world. While providing an introduction to the current state of the law in cyberspace, the course also explores the extent to which Internet technology challenges assumptions underlying traditional legal doctrine and requires reexamination of broader jurisprudential issues. Topics range from the 4th Amendment protection of electronic communications to the regulation of various network infrastructure access providers and search engines. No prior experience (technical or otherwise) is expected or required.

**LAW 6301 Directed Reading**

Fall, spring. 1 or 2 credits. Arrange directly with instructor. Specific credit limits apply; carefully review registration form available from online registration site or registrar’s office. S–U grades only.

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 6301 Environmental Law**

Spring. 3 credits. Recommended prerequisite: Administrative Law. Letter grades only. J. J. Rachlinski.

The course surveys the major environmental laws, with a primary focus on federal statutes. Emphasis is 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 is 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.

**LAW 6401 Evidence**

Fall, spring. 3 credits. Limited enrollment. Fall, S. F. Colb, S–U or letter grades; spring, F. F. Rossi, letter grades only; spring, F. F. Rossi, letter grades only; spring, F. F. Rossi, letter grades only. 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 6421 Family Law**

Spring. 3 credits. Letter grades only. 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 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. Prerequisite: Constitutional Law. Second semester of Civil Procedure. Students without such background should consult with instructor. S–U or letter grades. M. Dorf.

This course examines the various constitutional 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 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 42 U.S.C. §1985; 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. Limited enrollment. S–U or letter grades. R. A. Green.

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 [formerly Banking Law]**

Spring. 3 credits. Not open to students who have taken Banking Law and Regulation. 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 United States. The principal focus is upon commercial banks, investment companies, insurance companies, pension funds, and securities firms. Legal topics include entry, functional and geographical restrictions; consumer protection and competition—promotion; capital adequacy, solvency and related forms of risk regulation; community reinvestment; and “self-regulation.” We also devote some attention to “alternative” financial service providers such as check-cashing services, community development financial institutions, and micro-credit providers; and we take occasional note both of divergent jurisdictions’ dominant modes of financial intermediation and of the “globalization” of finance. No prior background in financial law or economics is required, but it is helpful.

**LAW 6471 Health Law**

Fall. 2 credits. S–U or letter grades. H. R. Beresford.

This course considers legal aspects of the organization, financing, and distribution of health care in the United States. It emphasizes issues of access, costs, quality, and address the use of regulation, litigation, and market-driven strategies to confront emerging problems. Readings are 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 of and 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 is on the
This course provides a broad introduction to the theory, doctrine, and history of land use regulation. Topics include zoning, homeowners' associations, nuisance, suburban sprawl, eminent domain, and regulatory takings. Readings are drawn from the leading cases as well as commentaries by scholars in the fields of law, architecture, and planning.

**LAW 6621 Law and Social Change: International Experience**
Fall. 3 credits. S–U grades with permission of instructor or letter grades.
M. E. Greenberg.
This class is intended for students who are interested in law reform initiatives within international development, or are concerned about how local legal contexts affect international business transactions. As compared with courses involving international or transnational law, this curriculum focuses on how local legal systems relate to social and economic change in different nations and cultures. It incorporates both "law and development" and "rule of law" experience to consider assumptions about legal systems, various sources of regulation, and factors that weaken the "rule of law." Policy issues are drawn from around the world and include child labor, women's rights, democracy-building, corruption, and environmental protection. Approaches range from strengthening how laws are drafted and enforced, to alternatives to legislation. Course requirements include several short "journal entries," of which one addresses a student-identified newspaper article, a take-home midterm, and a 20- to 25-page final paper.

**LAW 6631 Law for High-Growth Business (also NBA 6890)**
Fall. 3 credits. Limited enrollment. BR Legal students must preregister to receive first priority. S–U or letter grades. Z. J. Shulman.
An in-depth analysis of key issues that an emerging high-growth business must consider and address, including: choosing type of business entity; protecting confidential information and inventions; sources of capital; understanding capitalization structures (common stock, preferred stock, warrants, etc.); use of stock options as employee incentives; fundamental employment practices; proper establishment and use of boards of directors and advisory boards; technology licensing and commercialization, and acceptable business practices and the Foreign Corrupt Practices Act.

**LAW 6641 The Law Governing Lawyers**
Spring. 3 credits. Satisfies professional responsibility requirement. Enrolling in this course does not prohibit enrollment in another professional responsibility course. Letter grades only. W. B. Wendel.
This course provides a comprehensive overview of the law governing lawyers in a variety of practice settings, including transactional, counseling, and civil and criminal litigation. It focuses not 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 Law of Branding and Advertising: Trademarks, Trade Dress, and Unfair Competition
Fall. 2 credits. S–U or letter grades.
N. St. Landay
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 study of 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 6661 The Law of the European Union
Fall. 3 credits. S–U or letter grades.
M. Lasser
This course examines the composition, organization, functions, and powers of the European Union’s governing bodies; analyzes its governing treaties and constitutional law; and studies its 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 6661 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 economic development and foreign capital; obstacles to the flow of investments to developing countries; guaranteed rights 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 6694 Law and Religion
Spring. 3 credits. S–U or letter grades.
B. A. Meyler
Centered on the religion clauses of the First Amendment of the U.S. Constitution, this course treats a variety of questions that have arisen in the context of interpreting these provisions, including those involving: burdens placed upon the free exercise of religion; government funding of religion, particularly in the school voucher context; the potential differences between religious and other forms of expression; the relation between religious and commercial activity; and the extent to which religious groups as well as individuals can find protection within the American constitutional scheme. Methodologically, the class situates these issues within the comparative, historical, and philosophical fields. The treatment of religious liberties also as well as under international agreements sometimes diverges widely from that of the U.S. Supreme Court and can demonstrate the extent to which the American approach is far from inevitable. At the same time, examining the Anglo-American heritage of our contemporary notions of religious liberty, including those embodied in colonial charters and state constitutions, illuminates some of the reasons why we have adopted a particular orientation in this area. Finally, the philosophical texts that we read will assist us in understanding the normative underpinnings of the various conceptions of religious liberty that we cover. Students who enroll in the class are asked to complete a take-home examination or elect to fulfill a research-paper option.

LAW 6721 Mergers and Acquisitions
Spring. 3 credits. Prerequisite: Corporations/Business Organizations or equivalent for LL.M.s or permission of instructor. Letter grades only.
J. C. Teitelbaum
This course examines the principal business and legal issues in the purchase and sale of publicly held businesses. Emphasis is placed on the duties of directors in the acquisitions of publicly held companies (including hostile takeovers).

LAW 6731 Dispute Resolution: Negotiation, Mediation, and Arbitration
Fall. 2 credits. Limited enrollment. Letter grades only.
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 explores the characteristics of negotiation, mediation, and arbitration as well as the ethical concerns inherent in them, employing interactive and computer simulations, enabling the student to engage as a negotiator, dispute resolution advocate, mediator, and arbitrator.

LAW 6732 Cross-Cultural Negotiations
Fall. 2 credits. Limited enrollment. S–U or letter grades only.
D. Plant
This workshop is designed to give law students an intensive opportunity to develop negotiation skills that can be used in the global market place to create and repair relationships and to manage conflict. Classes consist primarily of interactive negotiations and communication exercises, together with some lectures. Problems negotiated will have some rudimentary IP overtones.

LAW 6742 Patent Law and Trade Secrets
Fall. 3 credits. An intellectual property survey course such as LAW 6511 is recommended but not required. Letter grades only.
O. Lilic
This course focuses on U.S. patent law while also touching on the related law of trade secrets. It covers the core doctrinal elements and policy issues involved. It explores patent law’s impact in diverse areas such as computer-related inventions and biotechnology. No technical background is required.

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 under international taxation 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. Öhlin
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 6560)
Spring. 3 credits. S–U or letter grades. Prerequisite: Real Estate Finance for Lawyers or basic finance course.
D. L. Funk
This course examines real estate deals through a practitioner perspective within a case study and transactional approach. It 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 covered may include 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 addresses deals from the perspectives of investment fund manager, banker/lender, developer, REIT, joint venture partner/investor, and owner. The course includes assignments and exercises where students analyze real estate transactions, prepare and negotiate documents, and present transactions and deals to review entities.

LAW 6793 Real Estate Finance
Fall, meets first half of term. 2 credits. S–U grades only.
D. L. Funk
This course is designed as an introduction to real estate finance to equip students to understand the financial aspects and structures of the real estate transactions and deals that they are involved in as part of their careers. It introduces students to real estate financial analysis, including conventional discounted after-tax cash flow models using spreadsheets as well as other valuation and option pricing models. Students learn basic time value of money concepts and are introduced to the real estate financial models used in real estate development and finance.

LAW 6801 Remedies in Litigation
Spring. 3 credits. Letter grades only.
E. L. Sherwin
This course examines the remedial consequences of lawsuits and the remedial choices open to litigants: essential strategic information for students considering a litigation-oriented practice. It covers
compensatory remedies, injunctions, and special remedies such as constructive trusts. It also clarifies the meaning of equity and the role of equity in modern American law, as well as the developing law of unjust enrichment. The course focuses on private law (torts, contracts), but it also includes some coverage of remedies for enforcement of Constitutional rights and public law.

**LAW 6811 Secured Transactions**  
Fall. 2 credits. Prerequisite: none. S–U or letter grades. A. Shapiro.

A study of Article 9 of the Uniform Commercial Code, the law regarding security interests in personal property. 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 explore some of the theoretical issues involved in security and debt. (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**  
Fall. 3 credits. Prerequisite: Corporations/ Business Organizations (or equivalent for LL.M.s). This requirement may be waived only with permission of instructor. A student may enroll in Corporations/ Business Organizations concurrently. S–U or letter grades. J. C. Teitelbaum.

This course focuses on the regulation of two key aspects of the capital markets in the United States: the primary markets for the raising of capital from public investors governed by the Securities Act (33 Act), and the trading of securities in the secondary market governed by the Securities Exchange Act (34 Act). The course features extended discussion of the complex substantive and financial disclosure obligations required under U.S. federal securities laws, including the interaction between the 33 Act and 34 Act schemes via integrated disclosure, the preparation of disclosure documentation, exemptions from disclosure requirements and private placements, the relationship between disclosure and various anti-fraud rules, and the duties of the main participants in securities transactions (including underwriters, lawyers, and accountants). The course also touches upon how U.S. federal securities laws, including the Sarbanes-Oxley Act of 2002, regulate business practices of issuers and distribution participants.

**LAW 6822 Social Science and the Law**  
Spring. 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. 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 6831 Social Security Law**  
Spring. 3 credits. S–U or letter grades. P. W. Martin.

The course focuses especially on how Social Security’s benefit rules relate to employment, families, and household composition and how its procedures address the challenge of adjudicating the massive numbers of benefit claims that arise each year. It introduces the general features of the social insurance model of entitlement, benefit formulae, and procedural rules; highlights those that pose the greatest difficulty to administrators and advocates; and surveys current proposals for change. The course meets once per week; the balance of the instruction and discussion takes place online.

**LAW 6841 Sports Law**  

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 6861 Supervised Teaching**  
Fall, spring. 1 or 2 credits. Arrange directly with instructor. Specific credit limits apply—carefully review the registration form available from online registration site or registrar’s office. S–U grades only.

**LAW 6871 Supervised Writing**  
Fall, spring. 1, 2, or 3 credits. Arrange directly with instructor. Specific credit limits apply—carefully review the registration form available from online registration site or registrar’s office. S–U grades only.

**LAW 6881 Supervised Teaching and Supervised Writing—Lawyering Program Honors Fellows**  
Full year. 4 credits. Prerequisite: application process. Specific credit limits apply—carefully review the registration form available from online registration site or registrar’s office. S–U grades only.

**LAW 6891 Taxation of Corporations and Shareholders**  
Fall. 3 credits. Prerequisite: Federal Income Taxation. LL.M. students must secure permission of instructor. S–U or letter grades. R. A. Green.

This course examines the federal income taxation of corporate transactions, including incorporations, dividends, redemptions, liquidations, and reorganizations.
Students 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 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 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, provide advice and recommendations. Students apply what they have learned to the drafting of an appellate brief based on an actual court record. The brief is written in stages and followed by one-on-one critiques. Student 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 7091 Biblical Law**

Fall. 3 credits. Limited enrollment. Satisfies the writing requirement. S–U or letter grades. 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, legal issues in the narratives, law and morality, law and religion, the transformation of extralegal relations into legal ones, legal interpretation in antiquity, social factors in legal development, and aspects of criminal, family, and private law.

**LAW 7101 Central Topics in Jurisprudence and Legal Theory**

Fall. 3 credits. Limited enrollment. Satisfies the writing requirement. Letter grades only. S. Goldstein and R. S. Summers

This seminar addresses four related topics that arise within all discrete law schools: (1) the rational design of overall forms and functional legal units and other phenomena of contemporary life; (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. Assigned seminar materials include a recent book by Prof. Summers, selected jurisprudential readings, judicial opinions, statutes, and other primary sources. There is extensive opportunity for seminar discussion. The grade is based on a seminar paper and class discussion.

**LAW 7102 Capital Punishment Law**

Fall. 3 credits. Limited enrollment. Satisfies the writing requirement. S–U or letter grades. C. Seeds

This seminar examines the complex body of law governing imposition of the death penalty in the United States. It 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 capital cases. The primary focus is on Eighth Amendment jurisprudence. The course also examines 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 Punishment Clinic or the Capital Trial Clinic.

**LAW 7142 Comparative Constitutional Property**

Spring. 3 credits. Limited enrollment. Satisfies the writing requirement. Letter grades only. Prerequisite: Property and Constitutional Law. G. S. Alexander

This course examines legal practices concerning constitutional protection of property from a comparative perspective. The primary legal systems considered are the United States, Germany, and South Africa, but we look at other countries as well (e.g., Canada). The materials consist of cases from various jurisdictions and secondary sources (e.g., book excerpts, law review articles). No final exam is given, but weekly papers plus a longer final paper are required.

**LAW 7153 Corporate Governance and Capital Structure**

Fall. 3 credits. Limited enrollment. Satisfies the writing requirement. Letter grades only. C. K. Whitehead

The analysis of corporate governance, within most survey classes, turns on the ability of shareholders to vote in new management, in theory providing some broad oversight over corporate behavior. This seminar takes a more in-depth approach to considering the relationship between capital structure and governance. Questions considered include: What is the role of debt in corporate governance, and how does it relate to the traditional role of voting stock? To what extent is the value of private equity driven by the unique capital structure introduced to portfolio companies, and what value be replicated in public firms? Does the growing role of derivatives and other risk transfer instruments impact how corporations are (or should be) governed? And, as the capital markets continue to evolve, how will changes in those markets impact how firms are controlled?

**LAW 7162 Contemporary American Jury**

Spring. 3 credits. Limited enrollment. Satisfies the writing requirement. Letter grades only. V. Hans

This course evaluates claims about the benefits and drawbacks of the contemporary American jury. Drawing on the work of legal scholars and social scientists, we will explore a range of topics relating to criminal and civil juries, including: jury selection; the use of jury consultants; juror perceptions of attorneys, evidence, and experts; individual and group decision-making processes; jury instructions; jury deliberations; damage awards; juries in death penalty cases; and jury reform. By studying legal and empirical scholarship about the jury, seminar participants should develop insights into jury trial functioning and policy debates over the jury’s role.
and punitive damages. Each student is
This seminar focuses on empirical studies of
fulfillment of the requirements of the course.
discrimination, and equal pay. Students are
approaches.
statutory problems implicated by such
This seminar analyzes the types of corruption
LAW 7154 Corporate Governance
Seminar
Fall. 3 credits. Limited enrollment. Satisfies writing requirement. Prerequisite: Business Organizations or Corporations. Letter grades only. M. M. Siskind.
The seminar provides an in-depth study of the principal issues involved in creating and maintaining an appropriate governance system for the modern publicly held corporation under evolving developments in international, federal and state legal and regulatory environments. It explores these developments and reconciles them with the traditional divisions of authority among shareholders, boards of directors, management, and other stakeholders. Topics include comparative international governance rules and structures, Sarbanes-Oxley and related regulations, stock exchange rules, auditor and director independence, mandated internal controls and corporate investigations, and the role of institutional shareholders and shareholder services organizations. The seminar explores corporate governance topics from both theoretical and practical perspectives.

LAW 7165 Criminal Law Theory
Spring. 3 credits. Limited enrollment. Satisfies writing requirement. S–U or letter grades. S. P. Garvey.
This seminar explores a variety of theoretical issues arising within the substantive criminal law. In particular, we discuss various Justifications for state punishment and theories of excuse, the heat of passion defense, the legitimacy of imposing punishment for negligence, the relevance of resulting harm to criminal liability, the defenses of duress and insanity, and the doctrine of imperfect self-defense.

LAW 7171 Corruption Control
Spring. 3 credits. Limited enrollment. Satisfies writing requirement. S–U or letter grades. 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 7172 Employment Discrimination
Fall. 3 credits. Limited enrollment. Satisfies writing requirement. S–U or letter grades. 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 7201 Empirical Studies of the Legal System
Fall. 3 credits. Limited enrollment. Satisfies writing requirement. Letter grades only. T. Eisenberg.
This seminar focuses 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 7231 Ethnoracial Identity in Anthropology, Language, and Law
(Also AMST 6420, ANTHR 6240, LSP 6240)
Spring. 3 credits. Limited enrollment. Satisfies writing requirement. S–U or letter grades. V. Santiago-Ilizarry.
This seminar examines the role that both law and language, as mutually constitutive mediating systems in constructing ethnoracial identity in the United States. We approach the law from a critical anthropological perspective, as a signifying and significant sociocultural system rather than as an abstractive system of rules, norms, and procedures, to examine how legal processes and discourses shape processes of cultural production and reproduction that contribute to the creation and maintenance of differential power relations. Course material draws on anthropological, linguistic, and critical race theory as well as ethnographic and legal material to guide and document our analyses.

LAW 7261 Feminist Jurisprudence
Spring. 3 credits. Limited enrollment. Satisfies writing requirement. S–U or letter grades. C. M. O'Connor.
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 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 then 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 7281 First Amendment Theory
An examination of competing theories about the scope and justification of freedom of speech, freedom of press, and freedom of religion. The seminar considers free speech theories focused on liberty, formal equality, self-government, public morality, dissent, and anti-domination; the relationship of various conceptions of democracy to freedom of press; and various conceptions regarding the optimal relationship between church and state. Among the more specific topics at issue in some of the readings are commercial speech, pornography, flag burning, subsidies of the arts, campaign finance, the structure of the mass media, government involvement with religious symbols, and vouchers to religious schools.

LAW 7295 Global and Regional Economic Integration: The WTO, EU, and NAFTA
Spring. 3 credits. Limited enrollment. Satisfies writing requirement. S–U or letter grades. 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 lawmaker processes, the direct effect and supremacy of EU law, and the development of the EU's freedom of movement (goods, services, persons, and capital). A basic introduction to NAFTA is also included. Student seminar papers may deal with issues arising within any of the three systems. Comparative studies are encouraged.

LAW 7311 Immigration and Refugee Law
Fall. 3 credits. Limited enrollment. Satisfies writing requirement. Prerequisite: Constitutional Law. S–U or letter grades. 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 demographics, 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 aliens, 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 7312 Intellectual Property Seminar: Theoretical Foundations of Intellectual Property
Fall. 3 credits. Limited enrollment. Satisfies writing requirement. Letter grades only. Grading is 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 the instructor). B. M. Frischmann.
This seminar explores the core theories that explain, justify, and continue to shape intellectual property law. It focuses on investigating theories in the context of a series of ongoing debates in intellectual property policy. Topic include Patents and Scientific Research, Proprietary versus Open Source Models of Innovation, Copyright and Literary Theory, and Intellectual Property and the First Amendment. We examine the idea of property and its usefulness in resolving issues of current social conflict. We begin with a general consideration of rights by examining some philosophical readings on rights theories, and critiques of those theories. We 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 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, and others.
throughout the semester are (a) the dangers of law) that the regime is settling upon. Three architecture”—both the processes by which “emerging markets” located in erstwhile under-regulation still found in the so-called and markets; and the inopportunity and particular, the U.S., EU and Asian (principally domestic financial institutions and markets—in in connection with medieval and modern court cases.

This course introduces law students to the terminology, principles, and concepts of classical Islamic law. After discussing the origins and evolution of Islamic law, we turn first to the organization of qadi courts (procedure and evidence) and then to specific areas of the personal law (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 is analyzed through the reading of expert judicial opinions or fatwas (in English translation) issued in connection with foreign persons who earn income in the United States.

An introduction to the practices and legal regulation as well as some of the opportunities and policy concerns raised by cross-border financial intermediation. The course begins with a brief overview of the principal instruments and institutions through which the regime is settling upon. Three systemic risk that the international financial system must address, (b) the fairness and efficiency of the distribution of financial opportunity that the system yields, and (c) the political legitimacy of the processes by which the legal components of the global financial system are established and structured. No specific degree of expertise in financial or international law or economics is required, but prior coursework or experience in one or more of these fields on the part of students will enhance classroom discussion.

This course introduces students to the economic approach to legal reasoning, with emphasis on how individuals actually respond to incentives, risks, and choices. The course builds on insights from several disciplines, including economics, jurisprudence, psychology, and neuroscience. Students are not required to have any formal background in these topics. Each week, students discuss a series of related writings and/or cases in class, seeking to understand and deconstruct the relevant arguments.

Students will write regular reaction papers to the readings (three to five per each) during the semester. The topics for these papers is "open": it is up to students to choose topics and pursue inquiries that interest them, so long as they connect to the ideas being addressed in the class.

This seminar takes an in-depth look at the factual, legal, and social background of notable legal decisions. The seminar is based on a recently published series of texts presenting the "stories" behind well-known first year cases. After reading and discussing a selection of cases from these sources, each student will prepare and present his or her own case history of a case selected by the student, working from briefs, related legal material, secondary sources, and, if possible, contacts with lawyers and parties. Grades are based on papers and presentations.
LAW 7582  Memory and the Law (also HD 6190)  Fall. 3 credits. Limited enrollment. Satisfies writing requirement. S–U or letter grades. C. Brainerd.

This course focuses on how the scientific study of human memory interfaces with the theory and practice of law. Students study relevant areas of memory research (e.g., storage, retrieval, false memory, memory defects in impaired populations) and memory theory. Students 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 come from primary library sources.

LAW 7583  Legal Responses to Terrorism  Spring. 3 credits. Limited enrollment. Satisfies writing requirement. Students who have taken "Terrorism and the Law" are not eligible to take this course. Previous enrollment in Criminal Procedure and Federal Courts helpful but not required. Letter grades only. S. D. Clynes.

In this seminar, different legal tools that the government has developed and used to respond to the threat of international terrorism. We examine the laws under which the government prosecutes suspected terrorists as criminals, investigates them as threats to national security, and treats them as wartime combatants. We explore the tension between national security concerns and civil liberties, as well as the separation of powers issues that have arisen. Congress and the federal courts have responded to the threat posed by terrorism. Topics include the so-called "material support" provisions of federal criminal law, electronic surveillance and physical searches under the Foreign Intelligence Surveillance Act, the use of "national security letters" to obtain records from third parties, the detention of alleged enemy combatants and the legal controversy over warrantless wiretaps, laws governing harsh interrogation methods, military commissions, and restrictions on access to federal courts. Students are required to select and read a book addressing legal responses to terrorism and write a critical analysis of the book's major themes.

LAW 7591  Mergers and Acquisitions  Fall. 3 credits. Limited enrollment. Satisfies writing requirement. Pre- or corequisite: basic Business Organizations/Corporations class at Cornell or another U.S./Canadian law school. Prerequisite: basic Contracts class from Cornell or another U.S./Canadian law school or basic contracts class (from any other law school) deemed comparable by professors. S–U or letter grades. 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 client interview/strategy discussions and negotiations by student teams acting as counsel to the buyer or seller, are interspersed with lectures on the business acquisition process and an analysis of selected publicly available documentation of actual acquisition transactions. The typical chronology of an acquisition: 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 7593  Income Taxations of Corporate Mergers and Acquisitions  Fall. 3 credits. Limited enrollment. Satisfies writing requirement. S–U or letter grades. Prerequisite: Federal Income Taxation. Recommended: completion of basic Federal Income Tax course or equivalent. If student has not taken such a course (or its equivalent) or is taking it concurrently with the seminar, it is strongly recommended that he or she attend two introductory lectures that Prof. Schnur will offer prior to the initial seminar; time and location of those lectures will be announced, but it is anticipated that they will be scheduled during the two or three days before the first seminar. Lectures also open to enrolled students who have previously taken Federal Income Taxation, but who would like a "refresher." R. Schnur.

This is an advanced seminar that, after reviewing the basic federal income tax principles governing taxable and non-taxable corporate mergers and acquisitions, introduces students to more complex tax planning issues and explores how these tax concepts are utilized in structuring acquisition transactions. The emphasis is on domestic rather than cross-border acquisitions. There is no final examination; students are asked to prepare several planning memoranda directed at different merger and acquisition fact patterns.


The course explores the idiosyncrasies and intricacies of New York practice and procedure, with a focus on practice in the New York Supreme Court (the primary court of general original jurisdiction in New York). It also examines rules concerning civility in litigation and the ethical boundaries of zealous representation.

LAW 7595  National and Multicultural Rights  Fall. 3 credits. Limited enrollment. Satisfies writing requirement. Letter grades only. C. Gans.

The main goal of the seminar is to conduct a critical discussion of the different types of multicultural and national rights, their possible justifications, and their desirable limits. To facilitate this, three major preliminary topics are discussed: the concepts of the nation and of cultural groups; a normative typology of nationalist ideologies, and how they relate to various types of multicultural programmes; and various justifications for multiculturalism and cultural nationalism (relativist and ultra-nationalist justifications; non-religious and liberal justifications). These preliminary discussions pave the way for the critical discussion of such rights as the right to self-determination, cultural preservation rights, poly-ethnic rights, nationalism and special rights in immigration, and territorial rights.

LAW 7601  Organized-Crime Control  Fall. 3 credits. Limited enrollment. Satisfies writing requirement. S–U or letter grades. R. Goldstock.

This seminar explores the challenges organized criminals pose to society and to traditional law enforcement techniques. Students undertake a simulated investigation using physical and electronic surveillance, the analysis of documentary evidence, and the examination of recalcitrant witnesses before a grand jury. The RICO statute is explored in detail as well as a variety of non-criminal remedies including forfeiture and court-imposed trusteeships.

LAW 7611  Philosophical Foundations of Legal Ethics  Fall. 3 credits. Limited enrollment. Satisfies writing requirement. Satisfies professional responsibility requirement. Letter grades only. W. B. Wendel.

This seminar examines the subject of legal ethics from the standpoint of moral and political philosophy. We examine such questions as the relationship between ordinary morality and professional obligations; whether professionals may be blamed morally for their clients' actions or for activities taken pursuant to professional roles; and the relationship between legal and political institutions and moral values. In addition to reading classic and recent articles, we apply theoretical models to the sorts of practical ethical dilemmas faced by lawyers. No background in philosophical ethics is presumed. We begin with a brief introduction to the subject through Bernard Williams' short book, Ethics. This seminar satisfies the law school and ABA professional responsibility requirements, but it is not intended as preparation for the MPRE or as an introduction to the law governing lawyers.


This seminar studies the strategies of complex commercial litigation, focusing on case development in the pretrial period. It addresses 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 are considered as well as the use of litigation to achieve business goals. Actual litigated cases are dissected and papers in the form of briefs and memoranda are written on each. Since 90 percent of commercial cases settle before trial, this seminar is a real-life presentation of the commercial litigation process.

LAW 7641  Problems in Advanced Torts  Fall. 3 credits. Limited enrollment. Satisfies writing requirement. Letter grades only. J. A. Henderson, Jr.

Students have an opportunity to write a paper on a topic of their choosing from the law of torts. Topics not typical of the Law 741 first-year torts course are preferable, including (but not limited to) products liability, business
LAW 7741 Separation of Powers
Fall. 3 credits. Limited enrollment. Satisfies writing requirement. Prerequisite: Constitutional Law and Administrative Law [student may enroll in prerequisites concurrently]. Students without such background should consult with instructor. Letter grades only. C. R. Farina.

The past 20 years have witnessed more debate about the nature and consequences of “separation of powers” than we have seen since the Founding. This seminar examines the ways in which this concept is understood and used by modern judges, legislators, executive officials, and scholars to justify, or to attempt to modify, the distribution of power within contemporary American government.

LAW 7742 Social Justice Lawyering
Fall. 3 credits. Limited enrollment. Satisfies writing requirement. S–U or letter grades. J. M. Miner and K. V. Comstock.

This course examines the relationship between law and social justice in several different contexts, including the structure of the legal profession and the delivery of legal services; the efforts to achieve social justice, civil rights, and the reform of public institutions through litigation, legislative, and other initiatives; the problem of access to courts and the role of the judiciary; and the role of lawyers working with community groups and movements. The course features presentations by practitioners and others who work in the area of public interest and social justice. In lieu of a research paper, students work in teams to produce studies of social justice lawyering on a topic of their choosing, through examination of a particular impact litigation/case lawyering case, legislative efforts to achieve reform, or other efforts to effect significant change through law.

LAW 7743 Social and Psychological Aspects of the Death Penalty (also HD 4140/6140)
Spring. 3 credits. Limited enrollment. Satisfies writing requirement. Prerequisite: Cornell doctoral students and law students. S–U or letter grades. C. Braiernd.

This course focuses on how the field of human development contributes to death penalty cases through the creation of social history reports on death-qualified defendants and provides training in how to prepare such reports. Students study relevant areas of death penalty law (e.g., Wiggins v. Smith, mitigation law, pre- vs. post-conviction) and design relevant research. Students 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 DSM–IV, social and family environment, prediction of future dangerousness, anti-social personality).

LAW 7783 Theories of Intellectual Property
Spring. 3 credits. Limited enrollment. Satisfies writing requirement. Letter grades only. O. Litvak.

Sizable disagreement and controversy surround the rationales for intellectual property. This seminar provides a survey of the academic literature with the goal of illuminating the central features of this debate. It explores the main theories that are used to analyze the field focusing primarily on theories of patent and copyright law. The seminar explores theories that support strong intellectual property rights as well as those that support weakening (or even eliminating) intellectual property.

LAW 7784 The War on Drugs
Spring. 3 credits. Limited enrollment. Satisfies writing requirement. M. J. Satin.

This seminar examines America’s War on Drugs, including its political and legal history, its evolution and development over the past 40 years, and its social and economic consequences. Specific attention is paid to its impact on people of color. To that end, the seminar examines the factors responsible for the 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, the relationship between drug offenses and violent crime, addiction and the efficacy of drug treatment, the movement to legalize drugs, and U.S. foreign policy toward countries supplying illegal narcotics. Students are expected to write two short reaction papers to the reading and a long research paper on a topic of their choosing.

LAW 7792 Water and Culture in the Mediterranean: A Crisis (also BEE 7540, DSOC 6940)

Fresh water has long been a scarce resource in most of the lands that border the Mediterranean, especially on the southern edges of the basin. Since Paleolithic times, fresh water has also been the greatest impetus to cultivation and civilization. As the 21st century begins, and urban populations escalate, the scarcity of the region’s water has become an acute ecological, political, and health problem. Competition for water made scarce by intensive irrigation and unequal distribution is already a major source of conflict in the Middle East. Studies of water resources in the Mediterranean area by the U.N. and other international organizations have drawn attention to the looming political, economic, and health threats posed by the scarcity of water in the region. The course is designed to fit into a team study of freshwater crises in the region, based on a series of case studies. These case studies are situated in watershed basins. Instead of dealing with the problem from a legal, technical, and scientific perspective, it focuses on the interests and attitudes of people in Mediterranean countries toward water, expressed in the many ways that include the arts, in the everyday rituals of religious and secular life, in social customs, sanitation, and agricultural practices. It also focuses on water rights and laws and how they affect the environment.

LAW 7801 Asylum and Convention Against Torture and Violence Appellate Clinic
Spring. 4 credits. Limited enrollment. S–U (with permission of instructor only) or letter grades. S. Kalantry and S. W. Yale-Loehr.

Students 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. These clients will typically have represented themselves pro se in Immigration Court. During the first part of the semester students will learn substantive and procedural asylum and Convention Against Torture (CAT) law, such as the nature of persecution, grounds for asylum and CAT claims, and the practical and social effects that these laws have on new immigrants who seek asylum or CAT relief. Classes may also cover practical knowledge needed for effective representation, such as advanced research and writing skills. During the second part of the semester, students work in teams of two on appellate briefs. These briefs will not only entail serious legal analysis, but may also require sociocultural and political research, so that the students can effectively write about the conditions of the client’s home country. Students will interview clients over the phone during this time, with the possibility of face-to-face interviews. Some clients may be incarcerated, and many are out-of-state. Students may also locate expert and other witnesses, and draft affidavits and motions. The students’ cases will provide a basis for more in-depth substantive learning, as well as practical skills and attorney–client issues. In class, each team will also discuss the legal and practice issues that arise in their case, so that all students can benefit from and assist with each individual case. Note: This course may require off-premises travel. The student is responsible for travel to and from the sites.

LAW 7802 Capital Appellate Clinic
Fall. 4 credits. Limited enrollment. Prerequisite: permission of instructor; Criminal Procedure, Evidence, and Capital Punishment Seminar preferred but not required. S–U or letter grades. J. H. Blume and S. L. Johnson.

Students assist in the preparation of appellate briefs in selected capital cases. Students work intensively with the recent research legal issues, and draft arguments. Unlike most of the death penalty clinics, no travel is required. Students study the preparation of appellate briefs in selected capital cases. Students work intensively with the recent research legal issues, and draft arguments. Unlike most of the death penalty clinics, no travel is required.

LAW 7811 Capital Punishment Clinic: Post-Conviction Litigation
Spring. 4 credits. Limited enrollment. Prerequisite: permission of instructor; Criminal Procedure, Evidence, and Capital Punishment Seminar preferred but not required. S–U or letter grades. J. H. Blume and S. L. Johnson.

Death penalty litigation: representation 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 necessity of investigation, research, and strategy for the cases. Note: This course may require off-premises travel. The student is responsible for travel to and from the sites.

**LAW 7812 Child Advocacy Clinic I**

- Spring. 4 credits. Limited enrollment.
- Prerequisite: permission of instructor. S–U or letter grades. A. J. Mooney.

Students participate in the representation of children who are the subject of family court proceedings. Cases are likely to involve children who are the subject of petitions such as: abuse or neglect, custody, termination of parental rights, status offense, and juvenile delinquency. Students 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 addresses cross-disciplinary concerns such as working with other professionals and using social science to assist a client. Additionally, the course focuses on child development and the particular ethical concerns involved with the representation of children. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites.

**LAW 7813 Child Advocacy Clinic II**

- Spring. 4 credits. Limited enrollment.
- Prerequisite: Child Advocacy Clinic I. S–U or letter grades. A. J. Mooney.

Students (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 abuse; (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 7821 Capital Trial Clinic**

- Spring. 4 credits. Limited enrollment.
- Prerequisite: permission of instructor; Criminal Procedure, Evidence, and Capital Punishment preferred but not required. S–U or letter grades. J. H. Blume and S. L. Johnson.

Students aid in the representation of a defendant charged with a capital crime. This clinic focuses on preparing a capital case for trial. Students are assigned both investigative and research tasks. Fact investigation and the development of a mitigation case are taught. One or two trips to the state of the offense (usually South Carolina) are typical, and expenses for those trips are reimbursed by the law school. Research projects that arise from the case are assigned. Most years students will gain experience with the use of focus groups and/or legal advocacy voir dire method. Regardless of individual assignments, all students are kept abreast of the developments in the case and included in discussions of strategy as they arise.

**LAW 7831–7832 Full-Term Externship**

- Fall, spring. 12 credits. Limited enrollment.
- Prerequisite: permission of instructor. S–U grades only. Fall, G. G. Galbreath; spring, J. M. Miner.

This course allows students to earn 12 credit hours as externs working full time at approved placement sites during the fall or spring semester of their third year, or the spring semester of their second year. Written application materials, including a letter to the instructors in the semester preceding the semester the student plans to enroll. The instructors review the applications and grant students conditional approval, contingent on acceptance by the placement and identification of an attorney at the placement who will supervise and mentor the extern. In addition to his or her work responsibilities for the placement, the extern will prepare weekly journal entries, provide samples of written work product, engage in regular electronic communication with the instructors, host the instructors for a site visit, and do a written evaluation of the experience. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites.

**LAW 7833 Criminal Defense Trial Clinic**

- Spring. 4 credits. Limited enrollment.
- Prerequisite: Evidence recommended or permission of instructor. S–U or letter grades. L. Salmans.

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 defenses, and engage in motion practice. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites.

**LAW 7855 International Human Rights Clinic**

- Spring. 4 credits. Limited enrollment.
- Recommended prerequisites: International Human Rights and/or Public International Law. S–U (with permission of instructor only) or letter grades. S. Kalantry.

In this clinic students learn substantive human rights law as well as human rights lawyering and advocacy skills. Students 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 develop their international research and writing, and communication skills by working in teams on projects for international NGOs, particularly in South Asia. The projects may involve legal action such as impact litigation, legal assistance and counseling, or legislative advocacy or be geared towards community education, media outreach, fact-finding, and reporting. Note: This course may require off-premises travel. The student is responsible for travel to and from the sites.

**LAW 7861 Judicial Externship**

- Fall, spring. 4, 5, or 6 credits (possibility of 4, 5- or 6-credit option if student and placement are willing to have student there two days a week). Limited enrollment. S–U or letter grades. G. G. Galbreath.

Students work with a trial or appellate court judge. Work involves courtroom observation, conferences with the judge, research, and writing memoranda and drafting decisions. Emphasis is on learning about judges, judicial decision-making process, and trials. There are weekly class meetings with readings and discussions of topics related to the externship experience. While the primary focus is the student’s work at the extern site, each student will also do class presentations, weekly journal entries, provide written work samples, and meet individually with the faculty member. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites.

**LAW 7863 Indigent Representation**

- Spring. 3 credits. Limited enrollment.
- Prerequisite: Evidence recommended or permission of instructor. S–U or letter grades. F. P. Berry.

This course introduces the student to the representation of indigent clients in criminal and family court proceedings. The course is an overview of various aspects involved in the representation and advocacy of indigent clients, including practical experience through client contact and court appearances. The course presents the different traditional approaches involved in the resolution of cases including litigation, plea bargain negotiations, and settlement agreements. The class also has the opportunity to explore the collaborative model approach in family cases. The course gives students an opportunity to contribute to the local community through quality legal presentation. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites.

**LAW 7871 Labor Law Clinic**

- Spring. 4 credits. Limited enrollment.
- Prerequisite: preference is given to students who have taken Labor Law. Administrative Law helpful, but not required. S–U or letter grades. A. Cornell.

This Labor Law Clinic provides 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 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 communicate directly with union representatives and are required to sort through the facts, research the issues, and provide information and advice. Students routinely draft legal memoranda, prepare and file pleadings and briefs as requested. 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 nonprofit organization, or a global union federation with ongoing cases or projects. Student
The sites.

This course requires off-premises travel. The student is responsible for travel to and from the sites.

LAW 7911–7912–7913 Neighborhood
Legal Services Externship 1, 2, or 3
Fall, spring. 4 credits. Limited enrollment.
S–U or letter grades. B. Strom.
Classroom component is provided by Clinical Skills 1, 2, or 3, 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. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites.

LAW 7921 Prosecution Trial Clinic
Fall. 4 credits. Limited enrollment.
Prerequisite: Evidence or permission of instructor. S–U or letter grades.
This course gives students the opportunity to prosecute felony and non-jury trials in Ithaca City Court. The course has both a classroom and 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 possession of marijuana) among others. Each student is expected to conduct multiple trials during the semester, depending on docket volume. During the semester, students will also be expected to attend workshops (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. Note: This course requires off-premises travel. The student is responsible for travel to and from the sites.

LAW 7931 Public Interest Clinic 1
Fall, spring. 4 credits. Limited enrollment.
S–U or letter grades. B. Strom.
Students handle civil cases primarily in low-income clients of the Public Interest Clinic under the supervision of the clinic faculty. Students interview and counsel; investigate and analyze facts; act as 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 classroom, in which students will develop interviewing, counseling, and advocacy skills through the use of readings, videotapes, discussions, and simulation exercises. Note: This course may require travel for purposes of participating in hearings.

LAW 7932 Public Interest Clinic 2
Fall. 4 credits. Limited enrollment.
Prerequisite: Public Interest Clinic 1 or a clinic course that included the Clinical Skills 1 classroom component. S–U or letter grades. 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 Clinic 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. Note: This course may require travel for purposes of participating in hearings.

LAW 7933 Public Interest Clinic 3
Spring. 4 credits. Limited enrollment.
Prerequisite: Public Interest Clinic 1 or a clinic course that included the Clinical Skills 1 classroom component. S–U or letter grades. 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 Clinic 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. Note: This course may require travel for purposes of participating in hearings.

LAW 7951–7952 U.S. Attorney's Office
Clinic I or II
Fall, spring. 6 credits. Limited enrollment.
S–U grades only. 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 U.S. 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 or participate in proceedings in the U.S. Courthouse. Students also attend a two-hour seminar once a week at Cornell. The seminar focuses 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. Note: This course may require travel for purposes of participating in hearings.

LAW 7953 Securities Law Clinic I
Fall, spring. 4 credits. Limited enrollment.
Prerequisites: None. Pre- or co-enrollment in Securities Regulation or Dispute Resolution recommended but not required. S–U or letter grades. W.A. Jacobson.
The course focuses 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 small investors. Substantive legal topics 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. Course work
includes training in skills such as interviewing potential clients, evaluating potential claims, preparing pleadings, conducting discovery, representing clients at hearings, and negotiating settlements. Class work includes 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. 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.

**LAW 4021 Competition Law and Policy**

Fall. 4 credits. No legal training or background required. ECON 1010 (Elementary Microeconomics) or its equivalent is a prerequisite, but students may not be enrolled concurrently. no advanced mathematics is used. Letter grades only. G. A. Hay

This course is intended for non-law students; law students interested in the subject should take the Antitrust Law course. This course examines 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 starts with actual cases (most of them arising in the U.S. antitrust law), and uses those cases to probe the legal, economic, and broad policy issues that the cases raise.

**LAW 4051 The Death Penalty in America**

Spring 4 credits. Undergraduates only. S-U or letter grades. 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 readings largely comprise reported death penalty cases, but are augmented by a variety of other sources, including empirical studies of the death penalty and the litigation experience of the professors. Although the focus is on capital punishment as practiced in the United States, we also consider international and comparative perspectives. Guest speakers provide a range of views, and law students with experience working on capital cases lead discussion sections.

**LAW 4061 Introduction to Legal Research**

Spring. 4 credits. Limited enrollment. S-U or letter grades. T. W. Mills. The goal of this course is to learn how to convey a written legal analysis that adheres to the conventions of the legal profession. Students learn how to research a legal issue and write an analysis of that issue while drafting a legal memorandum. For the research portion of the class, students will learn basic writing skills and the fundamentals of legal drafting.

**LAW 4131 The Nature, Functions, and Limits of Law (also GOVT 3131)**

Spring. 4 credits. Undergraduates only. Letter grades only. J. Chaletz. 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**

Underkuffler, Laura, J.S.M., Yale U. Prof.
Wang, Chenguang, LL.M., Harvard U. Wang
Distinguished Visiting Prof.
Wendel, W. Bradley, J.S.D., Columbia U. Prof.
Whitehead, Charles K., J.D., Columbia U.
Visiting Prof.

Legal Aid Clinic
Galbreath, Glenn G., J.D., Case Western
Reserve U. Clinical Prof.
Miner, Joanne M., J.D., U. of Connecticut,
Clinical Prof. Emeritus
Strom, Barry, J.D., Cornell U. Clinical Prof.

The Lawyering Program
Atlas, Joel, J.D., Boston U. Clinical Prof.
Coleman, Lisa, J.D., U. of Memphis. Visiting
Asst. Clinical Prof.
Mollenkamp, John R., J.D., U. of Texas. Assoc.
Clinical Prof.
Mooney, Andrea J., J.D., Cornell U. Assoc.
Clinical Prof.
Weigold, Ursula H., J.D., Cornell U. Assoc.
Clinical Prof.
Whelan, Michelle Fongyee, J.D., U. of Florida.
Asst. Clinical Prof.

Academic Library Staff
Callihan, Jean, J.D., Pennsylvania State U.
Head of Research Services and Lec. in Law
Court, Pat, J.D., Hamline U. Associate Law
Librarian and Lec. in Law
Finger, Charlie, 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
Jones, Julie, J.D., Northwestern U. Research
Attorney and Lec. in Law
Mills, Thomas, J.D., U. of Illinois. Research
Attorney and Lec. in Law
Morrison, Matthew, J.D., Mercer U. Research
Attorney and Lec. in Law
Pajerek, Jean M., M.L.S., SUNY at Albany.
Head of Technical Services

Members of Other Faculties
Associated with the Law School
Carmichael, Calum, M., B.Litt., Oxford U.
(U.K.) Prof. College of Arts and Sciences
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
Berenson, H. Richard, M.D., U. of Colorado.
Berry, Francisco P., J.D., Cornell U.
Blyth, John E., Dr.jur., Goethe U.
Brennan, Lorraine M., J.D., Suffolk 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.
Goldstein, Stephen, J.D., Georgetown 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.
Meyer, Judith P., J.D., Cornell U.

Mingle, James J., J.D., U. of Virginia
Plant, David W., LL.B., Cornell U.
Porter, Keith S., LLM., De Montford U. (U.K.)
Radice, Anthony M., J.D., Cornell U.
Roberts, Charles E., J.D., Syracuse U.
Roth, Nelson E., J.D., U. of California, Davis
Salisbury, Lance, J.D., Cornell U.
Sarachan, Robert A., J.D., Indiana U.
Bloomingt
Satin, Michael J., J.D., Cornell U.
Schour, Robert A., J.D., Harvard U.
Shapieo, Amy, J.D., Harvard U.
Siskind, Arthur M., J.D., Cornell U.
St. Landau, Norm D., J.D., Antioch C.
Yale Loebr, Stephen W., J.D., Cornell U.
Yusen, Stephen G., J.D., U. of Pennsylvania
ADMINISTRATION
Patrick Stover, director
Charles McCormick, director of undergraduate studies
Robert Parker, associate director of undergraduate studies
Cha-Sook You, assistant director of undergraduate studies
Christine Olson, 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 (HBHBS), 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 HBHBS programs require a rigorous course sequence in 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 HBHBS 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 Nutritional and Physicochemical Aspects of Foods; NS 3510 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 HBHBS 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). Courses in foods, nutrition, and dietetics; 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 (AESC) in their junior year, 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 and 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 languages, 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, or Professor Carole Bisogni, 328 MVR.

**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. 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.grad@cornell.edu, or www.nutrition.cornell.edu/grad.html.

**COURSES**

**NS 1150 Nutrition, Health, and Society**

Fall. 3 credits. S-U or letter grades.

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.

**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 4510 Obesity and the Regulation of Body Weight; NS 4305 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 Nutritional and Physicochemical Aspects of Foods, NS 4510 Mineral Nutrition and Chronic Disease; and NS 4410 Nutrition and Disease.
NS 1160 Personalized Concepts and Controversies Fall. 1 credit. Limited enrollment. Prerequisite: freshman or transfer standing. Corequisite: NS 1150. S-U grades only. J. Swezy.

Provides students enrolled in NS 1150 individualized assistance in many skills including using computers to analyze diets, finding and using scientific references, understanding and critiquing scientific articles, and reviewing material presented in lectures.

NS 1200 Nutrition and Health: Issues, Outcomes, 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 1220 Nutrition and the Life Cycle Spring. 3 credits. Prerequisite: one semester college biology or NS 1150. Letter grades only. P. Brannon.

Biological 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 issues during the life cycle.

NS 2450 Social Science Perspectives on Food and Nutrition Fall. 3 credits. Limited enrollment. 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 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. Prerequisite 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 (also BSOC 2601) Spring. 3 credits. Limited enrollment. Letter grades only. D. Moseley.

Explore contemporary issues, problems, and controversies in global health through an interdisciplinary perspective. Introduces the global burden of disease and then examines complex societal, 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 evolution as they apply to present-day humans and their hominin ancestors. Includes lectures and discussions of molecular and paleontological evidence of human evolution, the causes and consequences of evolutionary 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; next offered 2009–2010. 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 status and BIOL 3110. S-U or letter grades. Offered alternate years; next offered 2009–2010. D. Levitsky.

Multidisciplinary discussion of the causes, effects, and treatments of human obesity. Topics include the biology 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. Offered alternate years; next offered 2009–2010. P. Stover.

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, hydrogen bonding, 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. S-U or letter grades.

Offered alternate years. P. Brannon.

Advanced aspects of the biological bases of nutritional requirements for reproduction, growth, and development; in-depth critical analyses of the impact of nutritional status on the mother, fetus and young child; and integration of nutrition with life and behavioral sciences in understanding these aspects are addressed. Health disparities, obesity, and malnutrition are considered from global and domestic perspectives.

NS 3310 Physiological and Biochemical Bases of Human Nutrition Spring. 4 credits. Prerequisites: BIOBM 3300 or 3510, 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. Kazarian.

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 intake, metabolism, 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. 4 credits. Prerequisite: college biology; limited to DNS majors; must be NS, NS-CALS, or BHBS major. Recommended: NS 1150. Students must attend first lab and placement is forfeited. For further information, go to B21 Savage Hall. Letter grades only. K. O’Brien and J. Swanson.

Introduces human anatomy and physiology with particular emphasis on aspects of relevance to the nutritional sciences and
NS 4350 Introduction to Physicochemical and Biological Aspects of Foods (also FDSC 3300)  
Fall. 3 credits. Prerequisites: college-level courses in chemistry and biology. Letter grades only. R. Parker and J. Hotchkiss. For description, see FDSC 3300.

NS 3470 Human Growth and Development: Biological and Behavioral Interactions (also HD/ BSOC 3470)  
Spring. 3 credits. Prerequisites: BIO G 1101 or 1109 or equivalent; HD 1150 or PSYCH 1101 or equivalent. S-U or letter grades. Offered alternate years. J. Haas and S. Robertson. 
Discusses 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. Examines the consequences of early growth and its variations for current and subsequent behavioral, psychological, and physical development. Interaction between physical and behavioral or psychological factors is emphasized throughout the course.

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 and C. Bisogni. 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. 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 director of undergraduate studies. The form, available in B21 Savage Hall, is filed at course registration or within the change-of-registration period along with an add/drop slip in the Human Ecology registrar's office. 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. Study that predominantly involves library research and independent reading.

NS 4010 Empirical Research  
S-U grades only. Study that predominantly involves data collection and analysis or laboratory or studio projects.

NS 4020 Supervised Fieldwork  
S-U grades only. 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 4210 Nutrition and Exercise  
Spring. 3 credits. Limited enrollment. Prerequisites: NS 1150 and BIOAP 3110. Pre-or corequisite: BIOBM 3300, 3310, or NS 4410. S-U or letter grades. S. Travis. Examines the interaction between nutrition, exercise, and athletic performance. Topics include the biological, psychological, and sociological aspects of nutrition as it relates to exercise performance. Lectures cover current research on nutritional needs in response to exercise, including fluids, energy nutrient requirements and caloric distribution, supplementation, ergogenic aids, pre-/post-event recommendations. Applications to various sports. Critical thinking skills are enhanced by critiques of studies on sports nutrition-related topics and the evaluation of popular sports nutrition claims. Learn educational strategies for communicating with the recreational and professional athlete, coach, and trainer.

NS 4250 Nutrition Communications and Counseling  
Spring. 3 credits. Limited enrollment. Prerequisites: NS 4410 or 4420 and 4260; junior or senior standing; priority given to dietetics/nutrition majors. S-U 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. Additionally, 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, V. Utermohlen; spring, M. Caudill. Studies the anatomical, physiological, and metabolic abnormalities in acute and chronic illness and the role of nutritional therapy in their prevention and care. Topics include nutritional assessment, nutritional pharmacology, starvation, infection, trauma, cancer, diabetes mellitus, renal, and cardiovascular, pulmonary, skeletal, neurological, liver, and gastrointestinal disorders.

NS 4420 Implementation of Nutrition Care  
Fall. 3 credits. Pre- or corequisites: NS 1150, 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. Students have the opportunity to perform basic nutrition assessment skills in a local clinic and/or long-term care setting.

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. Pinnstrup-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. 3 credits. Prerequisite: NS 1150. Students must enroll in a policy lab. Students must attend first lec and lab or placement is forfeited. 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 4570 Health, Poverty, and Inequality: A Global Perspective  
Spring. 3 credits. Prerequisite: introductory microeconomics and statistics or permission of instructor. S-U or letter grades. Offered alternate years; next offered 2009–2010. D. Sahm. Course focuses on global health challenges, and how they are related to poverty and inequality.]
NS 4750 Mechanisms Underlying Mammalian Developmental Defects (also BIOAP 4750)
Spring. 3 credits. Prerequisites: BIOGD 2800, 2810, or 2820 (may be taken concurrently). Offered alternate years; next offered 2009–2010. D. Noden and P. Stover. Developmental defects are present in nearly 5 percent of humans. Drawing upon current research, this course explores the causes of birth defects, emphasizing the interplay between genetic and environmental factors in the regulation of developmental processes. Emphasis is on nutritional disruptors, teratogens, and regulatory gene networks that are well characterized through animal studies and are associated with morphological, physiological, reproductive, or behavioral abnormalities in humans.

NS 4880 Applied Dietetics in Food Service Systems
Spring. 3 credits. Limited to Dietetics seniors. Prerequisites: HADM 1100 or intro food service management course, NS 2470, and BIOMI 2900. White lab coat required. Fee for special supplies/training and activities: approx. $100. 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 other 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, 2830, or 2820 and BIOMI 3300, 3320 or 3330, or NS 3200. S-U or letter grades. P. Solorway. 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 genetics courses. Letter grades only. Offered alternate years. X. G. Lei and C. C. McCormick. For description, see ANSC 6030.

NS 6050 Nutritional Biochemistry Colloquium
Fall and spring. 1 credit. S-U grades only. Nutritional biochemistry faculty. Graduate seminar series that focuses on recent advances in biochemical 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 BIOMI 3300, 3320, or 3330 or NS 3200. Letter grades only. P. Solorway. Epigenetic effects refer to heritable 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. Prerequisites: undergraduate chemistry and biology including biochemistry; for undergraduates, permission of instructor. Recommended: cell biology. Letter grades only. Offered alternate years. 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. Prerequisite: TOX 6100 or permission of instructor. S-U or letter grades. Offered alternate years. S. Bloom, R. Dietert, D. Muscarella, and B. Strupp. Focuses on the metabolism of drugs and environmental toxicants to reactive forms that can modify DNA and proteins and induce target organ toxicity as well as mutations and cancer. Also emphasizes factors and pathways that can modulate toxic effects, including polymorphic drug-metabolizing enzymes, stress-activated signal transduction, and DNA repair. Discusses the uses of molecular and cellular stress markers for assessment of toxicant exposure and health risks.

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 will depend 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. S. Travis. 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. 1 credit. Prerequisite: NS 3310 or permission of instructor. S-U or letter grades. Fall, 2nd 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 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, K. O'Brien, R. Parker, and F. Stover. An 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 and staff. 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 the metabolic response to starvation; 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. 2 credits. Prerequisites: graduate standing and permission of instructor. Letter grades only. DNS faculty. 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. Next offered 2009–2010. J. Haas. 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. Next offered 2009–2010. Covers the meta-analysis, design, measurement, and analytic issues involved in developing, implementing, and analyzing studies of field intervention with nutritional impact.

NS 6400 Social Science Theories in Nutrition Fall. 3 credits. Limited enrollment. Prerequisite: graduate standing. 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 90-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 6500 Assessing Food and Nutrition in a Social Context]
and are offered as a separate 1-credit special topics course (NS 6660).

**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. International Nutrition faculty.
- 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. DNS faculty.
- 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. Asst. Prof.
- Caudill, Marie, Ph.D., U. of Florida. Asst. Prof. Devine, Carol M., Ph.D., Cornell U. Assoc. Prof.
- Dollahite, Jamie, Ph.D., U. of Texas. Assoc. Prof. and EFNEP Leader
- Frongillo, Edward, Jr, Ph.D. Cornell U. Prof. and Chair, Dept. of Health Promotion, Education, and Behavior, U. of South Carolina.
- 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 Meining Professor in Maternal and Child Nutrition
- Habicht, Jean-Pierre, Ph.D., Massachusetts Inst. of Technology. James Jamison Professor of Nutritional Epidemiology. Emeritus
- Kazarianoff, 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.
- McCormick, Charles, Ph.D., North Carolina State U. Assoc. Prof. and Dir., Undergraduate Studies
- Olson, Christine M., Ph.D., U. of Wisconsin. Prof. and Dir., Graduate Studies
- Parker, Robert S., Ph.D., Oregon State U. Assoc. Prof. and Assoc. Dir., Undergraduate Studies
- 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.
- Rasmussen, Kathleen M., Sc.D., Harvard U. Prof.
- Sahn, David, Ph.D., Massachusetts Inst. of Technology. Prof.
- Sobal, Jeffery, Ph.D., U. of Pennsylvania. Assoc. 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. Assoc. 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
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 Brian Page, Professor of Military Science and Chair, 255-5051/-4000
Captain Lasher, Major Miller, Major Brown, Major Johnson, Major Fosdick

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. A two-year program is available for those who qualify. The program includes specific courses in military science, more general academic subjects that assure a well-rounded education, practical training in leadership through participation in the Cadet Corps (including attendance at one 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 many branches of the Army. The student’s academic major, academic performance, leadership ability, personal desires, and the needs of the Army determine the branch of the Army into which the student is commissioned upon graduation.

Requirements for Enrollment
All courses are open to enrollment without a military obligation with instructor permission. Applicants must be citizens of the United States and be able to obtain a Secret level security clearance before being commissioned as lieutenants. Noncitizens may enroll in courses but not commission. Students must meet Army medical requirements. Overall sound mental and physical condition is essential; students are required to undergo periodic physical fitness tests. Enrollment and continuation in the program is subject to the approval of the Professor of Military Science. Enrollment in upper-division courses by students not formally enrolled in the program must be approved by course instructors. Contracted students must register for letter-grade military science classes and leadership laboratories for the purpose of commissioning after graduation into the United States Army.

Four-Year Program
The Four-Year Program is open to students in their freshman and sophomore year. 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 Army 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 may be available for 1.5 to 5 years. AROTC scholarships are awarded each year to entering freshmen and students in the freshman and sophomore classes. Scholarships pay full tuition and mandatory fees. Scholarship cadets and enrolled juniors and seniors also receive between $300 and $500 a month for up to 12 months a year. Scholarship cadets also receive $1,200 per year toward the cost of textbooks.

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) of 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. ROTC graduates have the option of serving four years on active duty and four years in inactive reserve status; however, some may serve eight years on reserve duty.

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 from 5 to 6 p.m. three days a week.

Freshman Year (MILS I)
MILS 1101 Foundations of Officership
Fall. 1 credit. Required. C. McFall. Students examine the U.S. defense structure in terms of organization, mission, personnel, and relationships among and between military forces and branches 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. The student develops skills in conducting oral and written presentations.

MILS 1102 Foundations in Leadership
Spring. 1 credit. Required. J. Lasher. 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. B. Miller. 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. 1 credit. Open to all students; limited to 20 per sec. Two 1-hour sec: M or R 9–9:50, Barton Hall G-1. Climbing wall fee: $20. B. Page. 
This course introduces students to the skills and 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 and spring. 1 credit. Open to all students; limited to 20. R 9–9:50, Barton Hall G-1. M. Hart. 
This course teaches the principles of orienteering including basic map reading, terrain association, and compass skills. Course runs and orienteering 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. Hart. 
This course teaches the principles of rifle and pistol safety including marksmanship fundamentals, range procedures, safe handling techniques, 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. B. Miller. 
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. B. Page. 
Provides an overview of the leaders, 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. B. Page. 
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  
All 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 4411 Leadership Laboratory IV  
Fall, spring. 0 credits. S-U. 
Cadets meet for two hours each week 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, and field exercises.

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 June 30 of the entering year 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 Reserve. 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 Chief of Naval Education and Training.

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 Naval or Marine Corps Reserve.

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 Reserve serve on active duty for a minimum of four years. College program midshipmen commissioned in the Naval or Marine Corps Reserve serve a minimum of three years. In some cases, following 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. The Marine College Program students are 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 CSMC 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, courtesy, 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. 0 credits. 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. J. Nault and D. Taylor.
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 2201 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.

**NAVS 3050 Navigation (also BEE 3050)**
Spring. 4 credits. D. Raincault.
Introduces the fundamentals of marine navigation emphasizing piloting and electronic navigation procedures. Covers coordinate systems, chart projections, navigational aids, instruments, compass observations, time, star identification, use of the nautical almanac, and study of tides and currents. Electronic navigation systems are discussed.

**NAVS 3302 Naval Operations**
Fall. 3 credits. D. Raincault.
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.

**NAVS 4401 Naval Ships Systems II (Weapons)**
Spring. 3 credits. R. Preston.
Examines the principles and theories used in the development of nuclear weapons systems. Initially, 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. J. Nault.
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.

**NAVS 3310 Evolution of Warfare**
Spring. 3 credits. D. Taylor.
A study of warfare that examines the relationship of military strategy to geography, economics, sociology, technology, and governmental policy. This course examines the historical evolution of warfare, including the 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. D. Taylor.
The history of the development, theory, techniques, and conduct of amphibious operations from 490 B.C. 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 one year of college-level study in mathematics, physical science, and English 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. In addition, one semester of computer science is required. 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 Chief of Naval Education and Training.

**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. Two semesters of courses (a minimum of 3 hours each) in the area of American Military Affairs or National Security Policy are required. One semester of a modern foreign language must be completed.

**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**

**Junior Year (Navy)**

**NAVS 3302 Naval Operations**
Fall. 3 credits. D. Raincault.
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 4401 Naval Ships Systems II (Weapons)**
Spring. 3 credits. R. Preston.
Examines the principles and theories used in the development of nuclear weapons systems. Initially, 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. J. Nault.
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.

**NAVS 3310 Evolution of Warfare**
Spring. 3 credits. D. Taylor.
A study of warfare that examines the relationship of military strategy to geography, economics, sociology, technology, and governmental policy. This course examines the historical evolution of warfare, including the 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. D. Taylor.
The history of the development, theory, techniques, and conduct of amphibious operations from 490 B.C. 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 one year of college-level study in mathematics, physical science, and English 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. In addition, one semester of computer science is required. 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 Chief of Naval Education and Training.

**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. Two semesters of courses (a minimum of 3 hours each) in the area of American Military Affairs or National Security Policy are required. One semester of a modern foreign language must be completed.

**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 James Blair, 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.
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, 384-953-2869. 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, officerhip 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. J. Blair.
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. J. Blair.
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. Johnson.
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.
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.coed.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.coed.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, trudgen, 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, 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 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, Masrouroudi, and Kasrulma 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 merengue. 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.
CPR 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.
This 180-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, 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, Level I
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 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 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.
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 1250 Aerobic Instructor Training
Fall and spring. Fee charged.
The course will help you teach aerobics and prepare you 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 class settings. The class is a combination of theoretical and practical applications of aerobic dance 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. Fee charged.
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 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 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.
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 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.

Golf Courses

PE 1320 Golf, Introduction to
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. 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.
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.
Climbing Wall.

OUTED 1640 Basic Rock Climbing
Fall and spring. Fee charged. Six indoor climbing sessions at the Lindseth Climbing Wall taught by and for women.

OUTED 1643 High Adventure
Fall, spring. Fee charged. Six sessions combining rappelling, rope traverses, tree climbing, and a 400-foot zipline.

OUTED 1644 Basic Outdoor Rock Climbing
Fall. Fee charged. Includes fall break trip. Two indoor classes and a four-day climbing trip 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.

OUTED 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
OUTED 1610 Backpacking in the Finger Lakes
Fall, spring. 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.

OUTED 1611 Backpacking in the Finger Lakes—Fall Break
Fall. Fee charged. Includes fall 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.

OUTED 1613 Wilderness Survival Skills
Fall. Fee charged. Hand-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.

OUTED 1614 Women's Backpacking
Spring. Fee charged. Escape from campus to explore the glens, gorges, wooded hills, waterfalls, vistas and trails of the Finger Lakes region. This fun introduction to backpacking includes a day outing and a long weekend backpacking trip. Learn basic outdoor living skills, including hiking, navigation, camping, equipment selection and use, back-country cooking, and safety. Share good times with new friends!
OUTED 1618 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.

Biking Courses
OUTED 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.

OUTED 1665 Mountain Biking—Fall Break
Fall. Includes fall break trip. Fee charged. Participants provide own mountain bike and helmet.
Develop and hone skills for riding a variety of trails, ranging from moderate fire roads to technical single track.

Canoeing Courses
OUTED 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.

OUTED 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 newly found skills. Course covers equipment, basic paddling techniques, deep water rescues, and considerations for day trips.

OUTED 1684 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, roll outs, ferrying, river dynamics, self-rescue, and river safety. Culminates with a weekend river trip.

Caving Courses
OUTED 1630 Caving
Fall. Spring. Fee charged.
Learn about the basic safety, techniques, and equipment for caving, finishing with a weekend caving trip.

Hiking Courses
OUTED 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.

OUTED 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.

OUTED 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, dress ing for the outdoors, map reading, outdoor safety, navigation, and natural history of the area.

OUTED 1606 Outdoor Birding Basics
Spring. Fee if taken for credit and successful completion of course; otherwise fee charged.
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. Sibleys guide to Eastern Birds is included in the course fee, and optics will be available to use during each outing.

OUTED 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-trips classes on the basics of photography. The course culminates with a weekend camping trip in the Finger Lakes region. Come join us and take photos of some of our most picturesque gorges.

OUTED 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.

OUTED 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
OUTED 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.

OUTED 1681 Whitewater Kayaking
Fall, spring, summer. 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.

OUTED 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.

OUTED 1683 1,000 Islands Sea Kayaking
Fall. Fee charged. Includes fall break trip. International travel documentation to Canada required.
Learn fundamental sea kayaking tourism 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.

OUTED 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.

OUTED 1686 Introduction to Sea Kayaking Seminar
Class covers equipment, basic paddling techniques, deep water rescues, and considerations for day trips.

Outdoor Leadership and Teambuilding Courses
OUTED 1619 Outdoor Leadership
Spring. Prerequisite: backpacking and camping experience. 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
OUTED 1625 Wilderness First Aid
Fall. Spring. Fee charged.
Full weekend of wilderness first aid. Includes CPR certification.

OUTED 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.

OUTED 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.

OUTED 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
OUTED 1690 Cross-Country Skiing
Spring. Fee charged. Four sessions learning basic cross-country skiing skills and exploring local forests in winter.

OUTED 1691 Cross-Country Skiing, for 24 and Over
Spring. Noncredit course Fee charged. Four sessions learning basic cross-country skiing skills and exploring local trails.

OUTED 1693 Basic Telemark Skiing
Spring. Fee charged. Four classes at Greek Peak ski area.

Personal Growth Courses
PE 1400 Body-Mind
Fall and spring. Students learn to use the wisdom of the body, movement, and voice. 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. 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 1402 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.

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 Swedish 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 1416 Introduction to Yoga
Fall, spring, and summer. Fee charged. 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.

PE 1417 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.

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. Review basic strokes plus topspin and underspin. Doubles strategy emphasized.

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.

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 Rifle**
Fall and spring. Fee charged.
Instruction and practice in the techniques of target rifle 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. 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, Introduction to**
Fall and spring.
Fundamentals of ball handling, serves, defensive blocks, and position play are stressed. Classes scrimmage.

**PE 1571 Volleyball, Intermediate**
Fall and spring.
Passing and blocking strategy; scrimmages in class.

**PE 1572 Volleyball, Advanced**
Fall and spring.
Offensive and defensive team strategy is emphasized in class scrimmages.

**PE 1575 Sports Officiating**
Fall.
This course will provide the student with the knowledge and expertise necessary to officiate intramural and interscholastic contests.

**PE 1576 Team Handball**
Fall.
An Olympic sport since 1972, team handball combines the skills of running, jumping, catching and throwing into a fast moving game. Elements of soccer, basketball, hockey and water polo all can be seen in team handball.

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.

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.
COLLEGE OF VETERINARY MEDICINE

ADMINISTRATION
Michael I. Kotlikoff, dean
Robert O. Gilbert, associate dean for clinical programs
Alfonso Torres, associate dean for veterinary publics and experiential, NYS Animal Health Diagnostic Laboratory
Hollis N. Erb, secretary of the college
Katherine M. Edmondson, assistant dean for learning and instruction
Robert T. Gilmour Jr., associate dean for research and graduate education
Gene R. Wheeler, assistant dean for finance and administration
Kevin Mahaney, executive director of alumni affairs and development
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 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 2008-2009 academic year.

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 somatosenory 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 Illa)
Spring. 9 credits. Prerequisite: first-year veterinary students; VTMED 5200. Letter grades only. Live animals used on limited basis for demonstration or 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 5500. Letter grades only. C. 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. 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 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 epidemiology 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. S. Fubini and D. W. Scott.

Integrates the clinical sciences of medicine, surgery, anesthesia, 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 emphasis on 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. 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. Focuses on providing 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) are conducted and disease prevention is 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. H. Miller and D. W. Scott.

Designed to provide clinical experience in the practice of small-animal surgery. Training through patient care, presentation of cases, and the direct supervision of the clinical 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 5602 Small-Animal Medicine**
- 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 small-animal medicine. Students assist experienced surgeons in the diagnostic evaluation and medical 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 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, election 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. Students participate in the direct supervision 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**

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 to perform 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 come with the experience 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 coverage 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.
- Involves hands-on diagnostic necropsies of mammals, birds, reptiles, and other exotic species that are presented to the Section of Anatomic Pathology necropsy service. Students work in groups of three to five for the two-week rotation. Necropsies are performed under the guidance of pathology faculty and residents. Students prepare written reports of necropsies performed that are reviewed by the faculty. Twice each week, students meet with a clinical pathologist to review current cases of interest.

**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 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 staff members also invited and encouraged to attend. S-U grades only. W. Smith, chair of Senior Seminar Committee.
- Gives the student the responsibility and opportunity of selecting and studying 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 at the time of 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. 1.0 credit Prerequisite: first-year veterinary students; VTMED 5701. 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 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. The opportunity to gain an appreciation of the role of animal husbandry in veterinary medicine is provided through a milking experience at the college’s dairy barn.

**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 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 zoonotic diseases, environmental health, and preventive care programs including vaccination protocols in large and small animals. One rotation in the Community and Augmented care and small group discussions are required of each student.

**VTMED 5705 Animals, Veterinarians, and Society (Part E: Introduction to Clinical Procedures) (Foundation Course VIIe)**
- Spring. 0.5 credit. Prerequisite: second-year veterinary medical 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 instruction 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, 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, 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 application, whereas others integrate basic science disciplines with clinical medicine and are co-taught by faculty 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. Letter grades only. J. Hermanston. 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 exercise focusing on surgical approaches. There are opportunities to dissect other carnivores, such as the ferret and the fox, depending on availability of specimens. The lecture augments 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 individual interest which 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. Hermanston. The goal of this course is to study anatomical variability among amniote (mammals, birds, and reptiles) and amniote (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. Letter grades only. 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 of 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 accommodate credit toward requirements in Distribution Courses I, II, III, IV, and V.

**VTMED 6222 Canine and Feline Medical Genetics**

Spring. 2 credits. Minimum enrollment 10; maximum 40. Prerequisite: VTMED 5200, 5300, and 5310. Letter grades only. 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 abnormalities, metabolic acidosis, metabolic alkalosis, and mixed acid-base disturbances.

**VTMED 6324 Antimicrobial Drug Therapy in Veterinary Medicine**

Spring. 1 credit. Prerequisite: second-, third-, and fourth-year veterinary students. Letter grades only. W. J. Roberts. 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
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 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. Schläffer. 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 impact of important emerging 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 modern epidemiology 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 transmission. 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 Parasiology
Fall and spring. 0.5 credits for attending eight one-hour parasitology sessions; student usually can easily obtain 2 hours on each of the rotating rotations (Ambulatory, Community Practice Service, Dermatology, Pathology, and Wildlife). Prerequisite: VTMED 5510; third- and fourth-year veterinary students. S-U grades only. A. Lucio-Forster 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 flotations on samples from 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, pathogenesis, veterinary medicine, 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. The course 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. Scarlet 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 “hard 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; maximum 40. 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 used in contemporary veterinary medical practice including general guidelines for vaccine use, and the logic underlying vaccine development.

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 the effects of disease is discussed. The course is conducted with three one-hour lectures per week and one hourlong large group discussion per week. Meets two days per week for one hour and one day per week for one hour. Grades are based on weekly quizzes, a final exam, a short paper, and attendance/participation.

DISTRIBUTION COURSES 421
VTMED 6430 Veterinary Perspectives on Pathogen Control in Animal Manure (also BEE/BIOMI 6430)
Spring, 2 credits. Prerequisite: third- and fourth-year veterinary students. Letter grades only. D. L. 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. Grades are based on 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 6431 Microbial Safety of Animal-Based Foods
Spring, 1 credit. Minimum enrollment 10; maximum 20. Prerequisite: second-, third-, and fourth-year veterinary students. Letter grades only. M. Wiedmann.
In the first two weeks, the instructor provides an overview of food safety issues relevant to the veterinary profession. The following four weeks are dedicated to student presentations on selected food-borne pathogens and food safety issues. In the final two weeks, lectures and discussions led by the instructors focus on emerging new issues in food safety and on farm-to-table technologies and approaches that can be used to assure the safety of animal-based foods.

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 of the operation of these 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 20. Prerequisite: VTMED 5400. S-U grades only. P. L. McDonough and staff.
Prepares veterinary 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. Mentions of modification to fit other small-animal populations (e.g., catteries, kennels) are made.

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 Protective 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 major diseases of shelters are covered. A variety of cases and their solutions are discussed. Course format includes lectures, case 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 6435 Forensic Science for Marine Biologists (also BIOSM 4450)
For description, see BIOSM 4450.

VTMED 6438 Veterinary Clinical Toxicology
Spring, 2 credits. Prerequisite: second-, third-, and fourth-year veterinary students. Letter grades only. K. M. Bischoff.
Aids veterinary students in their study of particular principles of toxicology and how the principles 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 concludes 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 6500 Veterinary Clinical Oncology
Spring, 1 credit. Minimum enrollment 15. Prerequisite: third- and fourth-year veterinary students. Letter grades only. K. M. Rassnick.
This course presents the common cancers affecting companion animals. Emphasis is placed on etiology, behavioral biology, and patient management. Surgery, chemotherapy, and radiation therapy as important methods to treat cancers in veterinary patients are discussed. Course format includes lectures. Attendance is required.

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, Biological 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. Kollas 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 also covered. 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 metabolism and essential nutrients of large and small 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 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. Kollia.

Concentrates on principles of captive wildlife management, both theoretical 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 zoological 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, South American, 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
Spring. 2 credits. Minimum enrollment 20; maximum 40. Prerequisite: third- and fourth-year veterinary students. Letter 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 calves, calves, cattle, 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. Kollia 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 setting and 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 lameness cases. 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 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. S-U grades only. S. Fubini (coordinator); 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. 1.5 credits. Minimum enrollment 10; maximum 50. 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
VTMED 6539 Disorders of Large-Animal Neonates
Spring. 1 credit. Minimum enrollment 10; maximum 24. Prerequisite: 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 to 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 (secured by 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. 1.5 credits. 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 24. 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 pathophysiologic 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 pathologic data and diagnostic materials (radiographs, ultrasonics), treatment plans, and prevention. The course expands knowledge gained in Foundation Course V, and 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: second-, third-, and fourth-year veterinary students. S-U grades only. M. Ludders, J. Morrisey, and C. 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 anatomy, nutrition 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. 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 identification 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 omus is placed on the student to explain/rationalize drugs employed in clinical cases in the teaching hospital.

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 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 6549 Small-Animal Theriogenology
Spring. 1 credit. Minimum enrollment 6; maximum 100. Prerequisite: third- and fourth-year veterinary students. Letter grades only. Theroi faculty. Discussion course in a lecture-based format designed to complement the knowledge gained in the theriogenology component of Foundation Course V, Animal Health and Disease. Content includes discussion of breeding management, infectious and noninfectious causes of infertility, and pathology of the male and female reproductive tracts, their diagnosis, and management. The course emphasizes conditions affecting dogs and cats.

VTMED 6550 Clinical Pharmacology
Spring. 0.5 credit. Prerequisite: third- and fourth-year veterinary students. S-U grades only. W. S. Schwark. 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 V and, under the supervision of a clinical faculty member, is aimed at facilitating the use of that knowledge into the practical skills of managing clinical cases.

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 may be covered include a selection from the following list: shock, trauma, stabilization, cardiopulmonary resuscitation, respiratory emergencies, cardiac
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. Helps veterinary students understand basic principles of dairy economics and business management and develop specific skills used by veterinarians in health economic decision making. Covers three main topic areas: (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 performances, 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 6558 Advanced Small-Animal Clinical Oncology
Spring, 1 credit. Minimum enrollment 20. Prerequisite: VTMED 6500. Letter grades only. K. M. Rassnick. Elective course designed to complement the required course VTMED 6500 Veterinary Clinical Oncology. Cancer is among the leading causes of death in dogs and cats and remains the number one concern of pet owners. Management and prevention of cancer in companion animals represents a significant component of the practice of small-animal veterinary medicine. This advanced course emphasizes the biologic behavior and patient management of cancers in dogs and cats more thoroughly than addressed in VTMED 6500. Additionally, molecular and cytogenetic methodologies that are likely to affect cancer diagnosis and management in the future are discussed. Finally, students are provided with the skills necessary to critically read and evaluate clinically based publications in the professional literature.

VTMED 6559 Applied Dairy Nutrition for Practitioners
Spring, 2 credits. Minimum enrollment 5; maximum 20. 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 credits. 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 the applications of veterinary dentistry in the disciplines of oral surgery, periodontology, endodontics, orthodontics, restorative dentistry, and prosthetics. This will be complemented by eight non-mandatory, 1-hour question and answer sessions and two mandatory 3-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 non-radiographic 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, R. Gleed. 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 non-pharmacologic treatment of acute pain, surgical pain, and chronic pain typical of cancer, degenerative diseases, and surgical or traumatic disuse 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’ understanding of pain recognition and treatment in animal patients.

VTMED 6600 Theriogenology 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. Exposure to clinical procedures in theriogenology as provided by Cornell University Hospital for Animals patient load and augmented by teaching herd animals.

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. Bedford, M. DaSilva 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. Bailey and staff. 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.
VTERM 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. Kollas 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.

VTERM 6604 Quality Milk
Fall. 2 credits. Prerequisite: VTERM 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.

VTERM 6605 Special Opportunities in Clinical Veterinary Medicine
Fall, spring, and summer. Prerequisite: VTERM 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. On-site supervisors of the block are required to evaluate each student formally.

VTERM 6607 Poultry Medicine and Production Rotation
Fall, second-week rotation that takes place at University of St. Hacinthe or University of Guelph in alternating years. 2 credits. Prerequisite: VTERM 5510; third- and fourth-year veterinary students. Letter grades only. 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.

VTERM 6608 Clinical Oncology
Fall and spring. 2 credits. Maximum enrollment 4 per rotation. Prerequisite: VTERM 5510; third- and fourth-year veterinary students. Letter grades only. K. M. Rassnic 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 the oncologic patient, 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.

VTERM 6609 Animal Behavior Clinic
Fall, winter, spring, and summer. 2 credits. Maximum enrollment 2 per rotation. Prerequisite: VTERM 6751; third- and fourth-year veterinary students. S-U grades only. K. A. Houpt and staff.
Students participate fully in the Animal Behavior clinician's 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 completing a differential diagnosis 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.

VTERM 6610 Herd Health and Biosecurity Risk Evaluation Using the NYS Cattle Health Assurance Program (NYSCHAP) Model
Summer. Fall 2 credits. Minimum enrollment 5. Prerequisites: VTERM 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, Johnne's disease, standard operating procedures, global trade, and environmental issues. Additionally, two local farmers are visited to give students the opportunity to implement knowledge gained in lectures.

VTERM 6611 Small-Animal Orthopedic Surgery Service
Fall, winter, spring, and summer. 2 credits. Letter grades only. E. Trotter 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.

VTERM 6612 Large-Animal Orthopedic 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.

VTERM 6613 Equine Specialty Rotation
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 to 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.

VTERM 6614 Large-Animal Clinical Emergency and Critical Care
Summer and spring. 2 credits. Prerequisite: third- and fourth-year veterinary students. S-U 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 emergency 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 veterinarians 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.

VTERM 6615 Special Topics in Ambulatory and Production-Animal Medicine
Fall, winter, spring, summer. 1–2 credits, variable. Prerequisite: second-, third-, and fourth-year veterinary students. VTERM 5600 and permission of instructor. Letter grades only. M. E. White and staff.
Provides specialized experiences for students 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, research, 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 performing dental prophylaxis, basic periodontal procedures, and basic and advanced extractions.

VTMED 6617 South American Camelid Specialty Rotation

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 technical techniques that will build upon the skills learnt 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 a 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 investigations (including pregnancy and fertility examinations), sick and lame animal evaluation and treatment, and other health maintenance procedures make up the majority of non-emergency 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 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 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. Kollas, A. J. Bezuidenhout, and D. Mascarello.

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 comparisons between marine, 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 the diverse fields of aquatic-animal medicine. Students present seminars on appropriate topics.

VTMED 6723 Veterinary Medicine in Developing Nations
Spring. 2 credits. Minimum enrollment 40. Prerequisite: first-, second-, third-, and fourth-year veterinary students or permission of instructor. S-U grades only. Offered even-numbered years; next offered 2009–2010. K. A. Schat.

Veterinary medicine has an important role to play in developing nations in developing and providing economical sources of animal proteins 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. 1 credit. Does not fulfill 1-credit Set VII minimum. Prerequisite: first-, second-, and third-year veterinary students. Must be completed in two consecutive semesters (either fall to spring or spring to fall). S-U grades only. M. Smith.

Attendance at 14 of the senior seminar sessions presented during the academic year constitutes acceptable completion of this course.

VTMED 6725 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. Whiteaker.

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 or outpatient medical aspects and communication with clients. Successful completion requires satisfactory participation during 10 half-days of clinical service.
VTEMD 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.

VTEMD 6729 Introduction to Equine Practice
Spring. 0.5 credit. Maximum enrollment 30. Prerequisite: first- and second-year 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.

VTEMD 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.

VTEMD 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. The student has the opportunity to participate in three cases. Behavioral and pharmacological treatments for behavior problems are presented.

VTEMD 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.

VTEMD 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 pets, the proliferation of free-roaming cats and dogs, 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.

VTEMD 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 managing 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.

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

VTEBS 3460 Introductory Animal Physiology (also BIOAP 3110) (Undergraduate)
Fall. 3 credits. Prerequisites: BIOG 1105, 1106, or 1101, 1102, 1103, 1104, 1107, 1108; CHEM 2070, 2080, or 1500, or 2150, 2160; MATH 1106, 1110, or 1910 or AP credit for any of the above; or one year college-level biology, chemistry, and math. S-U or letter grades. 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 physical-chemical mechanisms.

VTEBS 4010 Genomic Analysis
Spring. 3 credits. Prerequisites: upper-level undergraduates and graduate students; BIOGID/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.

VTEBS 6000 Special Projects in Anatomy
Fall. 1 credit. Prerequisite: permission of instructor. Letter grades only. Biomedical science staff.

VTEBS 6100 Genomes as Chromosomes
Fall. 1 credit. Prerequisites: upper-level undergraduates and graduate students; others by permission of instructor or BIOGID 2810 and BIBM 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.

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 and 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; next offered 2009–2010. 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 4000 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 7200 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. 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, non-human 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 2 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 mammalian cell cycle 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 Special Problems in Molecular and Integrative Physiology (Graduate)] Fall and spring. 1 credit. Prerequisite: permission of instructor. S-U or letter grades. R. Davisson. Graduate student presentation of research work in progress; additional sessions dedicated to discussion of career development and scientific integrity.

[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. Schimenti 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.

[VTBCS 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; next offered 2010–2011. 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.

[VTBCS 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; next offered 2008–2009. 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.
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 3310 Basic Immunology (also BIOG 3050; Undergraduate)
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.

VETMI 3310 General Parasitology (also BIOI 3310; Undergraduate)
Spring. 2 credits. Prerequisites: zoology or biology course; any of the following: BIOMI 2610, 2640, 2670, 2740, 2750, 2780; BIOG 1101, 1102, 1103, 1104, 1106, 1107, 1108, 1109, 1110, 1700, 2020, 2070; BIOMI 1920, 2900, or equivalent courses. Letter grades only. D. D. Bowman.

Introduction to the basic animal parasites, stressing systematics, taxonomy, general biology, ecological interactions, and behavior of non-medically important groups. Also introduces the major animal parasites: protozoan, nematode, platyhelminth, acanthocephalan, annelid, and arthropod.

VETMI 4040 Pathogenic Bacteriology and Mycology (also BIOI 4040)
Spring. 2 or 3 credits; 3 credits with lec portion 15. Prerequisites: BIOMI 2610 and 2910. Letter grades only. Next offered 2009–2010. D. P. Deblieck.

Course in medical microbiology, presenting the major groups of bacterial and mycotic pathogens important to human and veterinary medicine. Emphasizes infection and disease pathogenesis.

VETMI 4090 Principles of Virology
Fall. 3 credits. Prerequisites: BIOMI 2900 and 2910 or permission of instructor. Recommended: BIOMI 4080, BIOMI 3300–3320, 4320. S. Lazarowitz, K. 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-cell interactions and common features between different viral families.

VETMI 4310 Medical Parasitology (also BIOI 4310; Undergraduate)
Fall. 2 credits. Prerequisites: zoology or biology course; any of the following: BIOE 2610, 2640, 2670, 2740, 2750, 2780; BIOG 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1700, 2020, 2070; BIOMI 1920, 2900, 3980, or equivalent course. Letter grades only.

D. D. Bowman.

Systematic study of arthropod, protozoan, and helminth parasitism of public health importance, with emphasis on epidemiologic, clinical, and zoonotic aspects of these parasitisms.

VETMI 6050 Special Projects in Microbiology (Undergraduate)
Fall. 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; next offered 2009–2010. 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 (also BIOG 7050; Graduate)
Spring. 1–5 credits. Prerequisite: basic immunology course or permission of instructor. Letter grades only. Offered even-numbered years. C. Leifer and staff.

Coverage at an advanced level of molecular and cellular immunology.

VETMI 7070 Advanced Work in Bacteriology, Virology, and Immunology (Graduate)
Fall, spring. 1–5 credits. Prerequisite: basic immunology course or permission of instructor. Letter grades only. Offered even-numbered years. C. Leifer and staff.

Coverage at an advanced level of molecular and cellular immunology.

VETMI 7150 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.

**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 (also BLOG 7060; Graduate)**
Spring. 2 credits. Prerequisite: basic immunology andmouse or permission of instructor S-U or letter grades. Offered odd-numbered years. E. Y. Denkers and staff.

Focuses on molecular and cellular mechanisms underlying the immunity to infectious diseases caused by viral, bacterial, protozoan, and helminth pathogens.

**VETMI 7230 Current Topics in Immunology**
Fall, spring. 1 credit. Registration each semester required 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, M. Hesse, H. Marquis, J. Parker, M. Scidmore, and G. Whittaker.

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.
[VETMM 7070] **Protein NMR Spectroscopy** (also BIOB 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; next offered 2009–2010. 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/her knowledge in a biology area and simultaneously increase skills and confidence in his/her teaching abilities. Specific teaching assignments will be administered through the CVM Office of Graduate Education. A faculty mentor will provide ongoing feedback.

[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. Letter or S–U 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; The Role of Calcium in Stimulus-Secreion Coupling—C. M. S. Feurtell; 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. Letter or S–U grades. Reading and discussion. 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-Secreion Coupling—C. M. S. Feurtell; Cell Calcium—G. M. S. Feurtell.

[VTPMD 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 BLOG 100 level) or permission of instructor. J. Scarlett, H. Erb, Y. Grohn, L. Warnick, H. Mohammed, and Y. Schukken.

Mentored research apprenticeship designed to give laboratory experience in applied epidemiology to qualified unmatriculated high school students (participating in Cornell Summer College) or Cornell underclassmen. Students are placed in a research laboratory with a designed project under the direction 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 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 critique 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, spring. 1–3 credits. Prerequisites: VTPMD/ VETCS 6640 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/clincal 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.
Allen, Louise Clare V., D.V.M., U. of Cambridge
Alcaraz, Ana, D.V.M., U. Autonoma Natl. de
Abou-Madi, Noha, D.V.M., U. of Montreal

The purpose of this course is to investigate an epidemiologic topic with one of the instructors. It provides experience in problem-solving and prepares students for research careers in epidemiology to receive graduate research credits for projects with epidemiological components.

Fall, spring, and 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 their doctoral 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 projects with epidemiological components.


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.

Abou-Madi, Noha, D.V.M., U. of Montreal (Canada). Lec., Clinical Sciences
Ainsworth, Dorothy M., Ph.D., U. of Wisconsin, Madison. Prof., Clinical Sciences
Alcaraz, Ana, D.V.M., U. Autonoma Natl. de Mexico. Lec., Biomedical Sciences
Allen, Louise Clare V., D.V.M., U. of Cambridge (U.K.). Instr., Clinical Sciences
Altier, Craig P., Case Western Reserve U. Assoc. Prof., Population Medicine and Diagnostic Sciences
Antczak, Douglas F., Ph.D., U. of Cambridge (U.K.). Dorothy Havermeyer McConville Professor of Equine Medicine, Microbiology, and Immunology Graduate Faculty Member
Appel, Max J., Ph.D., Cornell U. Prof. Emeritus, Microbiology and Immunology
Appleton, Judith A., Ph.D., U. of Georgia.

FACULTY ROSTER

VTPMD 7070 Clinical Biostatistics (Graduate)
Spring. 2 credits. Minimum enrollment 2; maximum 15. Prerequisite: veterinary residents and graduate students. Letter grades only. Offered odd-numbered years. J. M. Scarlett, H. N. Erb 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. 1 credit. S-U grades only. Y. T. Grohn.

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.


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.

VTPMD 7990 Independent Studies in Epidemiology

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.

Bailey Jr., Dennis B., D.V.M., Cornell U. Lec., Clinical Sciences
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-Guaza, 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
Bloom, Stephen E., Ph.D., Pennsylvania State U. Prof., Biomedical Sciences
Bowman, Dwight D., Ph.D., Tulane U. Prof., Microbiology and Immunology
Bowser, Paul R., Ph.D., Auburn U. Prof., Microbiology and Immunology
Buckles, Eliza L., D.V.M., U. of California, Davis. Asst. Prof., Biomedical Sciences
Bynoe, Margaret S., Ph.D.,instein 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, Yung Fu, Ph.D., Texas A&M U. Prof., Population Medicine and Diagnostic Sciences
Clark, Theodore G., Ph.D., SUNY Stony Brook. Assoc. Prof., Microbiology and Immunology
Cohen, Paula, Ph.D., U. of London (U.K.). Assoc. Prof., Biomedical Sciences
Collins, Ruth N., Ph.D., Imperial Cancer Research Center (U.K.). Asst. Prof., Molecular Medicine
Coonrod, Scott A., Ph.D., Texas A&M U. Prof., Population Medicine and Diagnostic Sciences
Cooper, Barry J., Ph.D., U. of Sydney (Australia). Prof., Emeritus, Biomedical Sciences/Administration
Costinhuso da Silva, Marco A., D.V.M., U. of São Paulo (Brazil). Asst. Prof., Clinical Sciences
Davisson, Robin, Ph.D., U. of Iowa. Prof., Biomedical Sciences
Debbie, Dorothy P., Ph.D., Stanford U. Sr. Lec., Microbiology and Immunology
delHantuna, Alexander, Ph.D., Cornell U. James Law Emeritus Prof. of Veterinary Anatomy, Biomedical Sciences
De Matos, Ricardo, D.V.M., Tech. U. Lisbon (Portugal). Lec., Clinical Sciences
Denkers, Eric Y., Ph.D., U. of Wisconsin, Madison. Assoc. Prof., Microbiology and Immunology
Dewey, Curtis W., D.V.M., Cornell U. Assoc. Prof., Clinical Sciences
Dhupa, Nishi, B.V.M. (Bachelors of Veterinary Medicine), U. of Nairobi (Kenya). Prof., Veterinary and Comparative Medicine
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

Dobson, Alan, Ph.D., Cambridge U. (U.K.). Prof. Emeritus, Biomedical Sciences
Dubovi, Edward J., Ph.D., U. of Pittsburgh. Prof., Population Medicine and Diagnostic Sciences
Ducharme, Normand G., D.V.M., U. of Montreal (Canada). James Law Professor of Surgery, Clinical Sciences
Duhamel, Gerald E., Ph.D., U. California. Davis. Prof., Biomedical Sciences
Dykes, Nathan L., D.V.M., Cornell U. Sr. Lec., Clinical Sciences
Earnest-Koons, Kathy, M.S., Pennsylvania State U. Sr. Lec., Microbiology and Immunology
Erb, Hollis N., Ph.D., U. of Guelph (Canada). Prof., Population Medicine and Diagnostic Sciences
Evans, Howard E., Ph.D., Cornell U. Prof. Emeritus, Veterinary and Comparative Anatomy, Biomedical Sciences
Farnum, Debbie, Ph.D., U. of Wisconsin, Madison. Prof., Biomedical Sciences
FitzMaurice, Marnie C., Ph.D., U. of Pennsylvania. Prof., Biomedical Sciences
Flamini, Maria Julia, Ph.D., Cornell U. Asst. Prof., Clinical Sciences
Flanders, James A., D.V.M., U. of California, Davis. Assoc. Prof., Clinical Sciences
Fletcher, Daniel J., Ph.D., U. of California, Berkeley. Lec., 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, Biomedical Sciences
Gerler, 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
Gilmour, Robert F., Jr., Ph.D., SUNY Upstate Medical Center. Prof. and Assoc. Dean, Biomedical Sciences and Administration
Gleed, Robin D., B.V.Sc., U. of Liverpool (U.K.). Prof., Clinical Sciences
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
Guard, Charles L. III, Ph.D., Case Western Reserve U. Assoc. Prof., Population Medicine and Diagnostic Sciences
Gunn, Theresa M., Ph.D., U. of British Columbia (Canada). Asst. Prof., Biomedical Sciences
Habel, Robert E., D.V.M., M.Sc., Cornell U. Prof. Emeritus, Anatomy
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
Summers, Brian A., Ph.D., Cornell U. Prof.
Emeritus, Biomedical Sciences
Suiter, 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, Margaret 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 and Dir., NYS Animal Health Diagnostic Laboratory
Tennant, Bud C., D.V.M., U. of California,
Davis. James Law Professor of Comparative Medicine, 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 and Dir., NYS Animal Health Diagnostic Laboratory
Tennant, Bud C., D.V.M., U. of California,
Davis. James Law Professor of Comparative Medicine, 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 and Dir., NYS Animal Health Diagnostic Laboratory
Tennant, Bud C., D.V.M., U. of California,
Davis. James Law Professor of Comparative Medicine, 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 and Dir., NYS Animal Health Diagnostic Laboratory
Tennant, Bud C., D.V.M., U. of California,
Davis. James Law Professor of Comparative Medicine, 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 and Dir., NYS Animal Health Diagnostic Laboratory
Tennant, Bud C., D.V.M., U. of California,
Davis. James Law Professor of Comparative Medicine, 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 and Dir., NYS Animal Health Diagnostic Laboratory
Tennant, Bud C., D.V.M., U. of California,
Davis. James Law Professor of Comparative Medicine, 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 and Dir., NYS Animal Health Diagnostic Laboratory
Tennant, Bud C., D.V.M., U. of California,
Davis. James Law Professor of Comparative Medicine, 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 and Dir., NYS Animal Health Diagnostic Laboratory
Tennant, Bud C., D.V.M., U. of California,
Davis. James Law Professor of Comparative Medicine, 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 and Dir., NYS Animal Health Diagnostic Laboratory
Tennant, Bud C., D.V.M., U. of California,
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.

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 for major requirements.

Explanations 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. 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 of 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 had 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 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, 503 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: ancient: 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 unfilled 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.

- **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, music, 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).

- **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
  - 3710 Human Paleontology

- **Anthropology**
  - 4150 Seminar in the History of Biology
  - 3940 Applied and Food Microbiology

- **Biological Sciences**
  - all 3- or 4-credit courses (including any combination of two courses from BIO 1101–1104) except BIOG 2990, 4980; BIOEE 3620; BIOMB 3210, 4200, 4230, 4420, and BIOSM 2400, 2490 and 4990 require permission from the Office of Undergraduate Biology.

- **Chemistry and Chemical Biology**
  - all 3- or 4-credit courses

- **Cognitive Science**
  - 1110 Brain, Mind, and Behavior

- **Earth and Atmospheric Sciences**
  - all 3- or 4-credit courses except 2900, 2500, 4350, 4940

- **Engineering**
  - 1220 Earthquake!

- **Entomology**
  - 3520 Insect Behavior

- **Food**
  - 3940 Applied and Food Microbiology

- **History**
  - 2870 Evolution

- **Horticulture**
  - 2430 Taxonomy of Cultivated Plants

- **Music**
  - 2111 Physics of Musical Sound

- **Natural Resources**
  - 3930 Introduction to Biogeochemistry

- **Nutritional Sciences**
  - 4750 Mammalian Developmental Defects

- **Physics**
  - all 3- or 4-credit courses

- **Plant Pathology**
  - 4000 Principles of Virology

- **Psychology**
  - 1110 Brain, Mind, and Behavior

- **Science and Technology Studies**
  - 2871 Evolution

- **Sociology**
  - 4700 Biophysical Methods
Students may select additional science courses from the following supplementary list:

**Animal Science**
1000 Domestic Animal Biology I
1500 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**
1110 Lasers and Photonics

**Archaeology**
3270 Environmental Archaeology
4263 Zooarchaeological Method
4264 Zooarchaeological Interpretation

**Anatomy**
3120 The Moving Body: Form and Function

**Biological Science**
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 Introductory Food Science

**Materials Science and Engineering**
2810 The Substance of Civilization

**Natural Resources**
2010 Environmental Conservation
2100 Introductory Field Biology
4200 Forest Ecology

**Nutritional Sciences**
1150 Nutrition and Health
3610 Biology of Normal and Abnormal Behavior

**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
3470 Computational Linguistics
4210 Numerical Analysis and Differential Equations
4220 Numerical Analysis: Linear and Nonlinear Equations
4760 Decision Theory I
4770 Decision Theory II
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
3210 Applied Econometrics
3250 Cross Section and Panel Econometrics
3270 Time Series Econometrics
3680 Game Theory
4050 Auction Seminar
4310 Monetary Economics
4760/4770 Decision Theory I and II

**Engineering**
1101 Engineering Applications of ORE
1700 Computation, Information, and Intelligence
2120 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
4483 Intensional Logic
4485 Topics in Computational Linguistics

**Mathematics**
all 3- or 4-credit courses except 1000 and 1009

**Philosophy**
2510 Introduction to Deductive Logic
3500 Foundations of Mathematics
3510 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 Economic and Financial Analysis, MATH 3500 Statistics Research and Design, SOC 3010, SOC 3011 Evaluating Statistical Evidence, STSCI 2010 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 from 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.

**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.

Available majors

Majors are offered by each of the departments. There are also majors in American Studies, Archaeology, Biology and Society, 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 even 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 may 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.

Minors

Students may pursue minors in any department in any college that offers them, subject to limits imposed 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 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. However, once 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. 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 or semester of extramural study in Cornell’s School of Continuing Education, semesters of study at other institutions while on leave from Cornell, 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 beginning of the 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. Upper-level courses taken in other colleges at Cornell University may count toward the 48 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. Accelerants 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 satisfy the eight-semester residence requirement and must spend at least four semesters in the college on campus in Ithaca.

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:

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.)

Part-time 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 their families' 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.

Part-time study in final semester

Students may complete their degrees with part-time study 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.

Students must obtain approval of an advising dean and complete the prorated tuition form in the semester before or during the first two weeks of the semester and confirm their status and registration with college registrar Sally O’Hanlon in 55 Goldwin Smith Hall.

Courses and Credits

Counting courses: Students must complete 120 credits (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:

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 281 (Genetics) = one and one-half course
Other 5-credit courses = one full course
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

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 reading, 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 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 437, 439).

Repeating courses

Students occasionally need to repeat courses. If the instructor certifies that the course content is 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 option 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 language (not language or culture that is acceptable for certifying option 1 in that subject) 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 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. 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).
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 other 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. 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 Kay Wagner 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.

Double Registration with and Early Admission to Professional Schools
Registration in the senior year of the College of Arts and Sciences for 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 dt2@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 this program should consult Dean James Finlay, Dean Maria DiCenso, or Deans DeVries, of 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.

Language House Program
A complement to classroom cultural and linguistic instruction, the Language House Program provides residential and academic opportunities for developing and practicing conversational skills in Arabic, French, German, Japanese, Mandarin Chinese, and Spanish. It helps prepare students who plan to study abroad and helps returning students share their cultural experiences while further increasing their language skills. Students interested in this program should contact the director of the Language House, 720 University Ave., 255-6453, or consult the program web site: languagehouse.arts.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 Lisa Harris in the Office of Arts and Sciences Career Services, 55 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. It rarely approves students’ participation in more than one off-campus program.

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 to 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 preparation 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 coursework
• 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 student’s native 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 200 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 not impede their progress toward the degree. Each 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 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 which students do not receive credit, and students must carry a full course load as defined by the host institution. To receive credit, students must fill out a transcript. To receive credit, students must fill after the college receives your official transcript. To receive credit, students must fill after completion of the semester abroad, and 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 tvp1@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 public service. 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. 21 or inquire at M101 McGraw Hall, 255-4090. Study in Washington during a final semester of residence is allowed rarely and only on the student's petition. Students should consult with an advising dean or in the Office of Undergraduate Admissions and Advising, 172 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 emphasis on collaborative learning and writing, students must understand the general standards and 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.

Forging 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.

ADVISNG
The following advisors and offices provide academic advising, help with problems, and information on college procedures and regulations.

Faculty 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 courses. 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 advisors wish to discuss academic or personal issues or to petition for an exception to college rules.

Student Advisors
Student advisors pass on lore about the college and life at Cornell and help new students become oriented to the university.

Major Advisors
After acceptance into a major, students are assigned a major advisor, a faculty member in the major department, with whom they shape and direct their 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.

Office of Undergraduate Admissions and Advising
This office, located in 55 Goldwin Smith Hall, 255-5004, and 172 Goldwin Smith Hall, 255-4093, 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.
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 in the “Student Center/Just the Facts” 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.

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.

Maximum number of credits per semester
First-year students must petition to enroll in more than 18 credits. 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.

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 any 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 next 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 as 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

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 must add them for a letter grade. A grade of S is equivalent to a course 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. 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 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, each time for the full number of credits for the whole course. The grade recorded at the end of the second semester evaluates the student’s performance in the course for the entire year.

Grade Reports
Grade reports are available online in the Student Center/Just the Facts 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/study/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 corroboration documentation. Students may appeal a decision 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 reeregister in the college, students must document what they did to understand 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 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 adviser 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. Students should 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. 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 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. 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 department 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.

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 wish 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 should 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 complete an 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 their degree 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.

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.

<table>
<thead>
<tr>
<th>Fall 2008</th>
<th>Spring 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last day for adding courses without petition</td>
<td>Sept. 19</td>
</tr>
<tr>
<td>Last day for adding a first-year writing seminar</td>
<td>Sept. 12</td>
</tr>
<tr>
<td>Last day for changing grade option to S-U or letter</td>
<td>Sept. 19</td>
</tr>
<tr>
<td>First deadline for submitting independent major requests</td>
<td>Sept. 29</td>
</tr>
<tr>
<td>Last day for dropping courses without petition</td>
<td>Oct. 17</td>
</tr>
<tr>
<td>Last day to petition to withdraw from a course</td>
<td>Nov. 21</td>
</tr>
<tr>
<td>Second deadline for submitting independent major requests</td>
<td>Nov. 24</td>
</tr>
</tbody>
</table>

Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall, for further information.

ASRC 2602.

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. After developing a foundation of knowledge on the culture, society, and development of Africa in the core course, ASRC 1300 African Studies, the Africana Studies and Research Center may administer 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 (*H* and geographical breadth (*G*) requirements, such as first-year writing seminars, language, social sciences, and history.

The center also brings distinguished visitors to the campus, sponsors a colloquium series, and houses its own 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 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 Africana Minor

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 (*H*) and geographical breadth (*G*) requirements, such as first-year writing seminars, languages, expressive arts, humanities, social sciences, and history.

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

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. After developing a foundation of knowledge on the culture, society, and development of Africa in the core course, ASRC 1300 African Studies, the Continental and Its People, students pursue 15 credit hours in a humanities or development studies track or a combination of the two, including an additional core course either ASRC 2300 African Civilizations and Cultures or CRP 4770/6770 Issues in African Development. The requirements for the certificate are a minimum of 18 credit hours, including the core courses. Students interested in the certificate program must contact the center’s director of undergraduate studies, who will register them in the program and assign them a faculty advisor from their own college. The faculty advisor will be responsible for determining completion of the certificate requirements.

Honor's

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 Arabic, ASRC 2101 or ASRC 3101 satisfy Option 1. For Yoruba, ASRC 2100 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.

Departments, Programs, and Courses

AFRICANA STUDIES AND RESEARCH CENTER


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 are consistently offered fall and spring semesters and also taught during summer/winter session.
ASRC 1100 Elementary Swahili I
Fall, winter, summer. 4 credits. Language lab times TBA. A. Nani.
Beginner's Swahili. Part I—Grammar for speaking, reading, and writing. Requires no knowledge of Swahili. Tapes 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 1101 Elementary Swahili II
Spring, summer, winter. 4 credits.
Prerequisite: ASRC 1100. A. Nani.
Continued study in reading and composition.

ASRC 1104/1105 Elementary Arabic I and II
Fall, spring, summer. 4 credits.
Prerequisite: ASRC 1100 or NES 1200.
ASRC 2101 Intermediate Arabic I and II (also NES 1203/2200)
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 1110 Intermediate Yoruba I
Fall, spring. 4 credits. 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 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 1111 Intermediate Yoruba II
Fall, spring. 4 credits. S. Mkhonza.
Yoruba, known by native speakers as IsiYoruba, is one of the 11 official languages of South Africa. Out of the four Nguni languages (Zulu, Xhosa, Swati and IsiNdebele), Zulu is the most widely spoken. The advantage of learning IsiYoruba 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
Fall, spring. 4 credits. 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 1130 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 Africanity, Islam, and Western civilization; main historical developments and transitions; contemporary economic, social, and cultural change. Africa's ties with the United States (from transatlantic slavery to the present), its impact on the emerging world order, and its contributions to world civilization are also explored.

ASRC 1160 Black Families and the Socialization of Black Children (SBA-AS)
Spring. 3 credits. M. Sabir.
Examination of the evolution of the Black family from its roots in Africa, the evolution of family forms, the impact of social policy, and a consideration of the literature stressing family and child well-being. Among the major topics considered are male/female relationships, childbearing and parental roles, the extended family, and economic and health issues. The component of the course focusing on youth primarily covers child and adolescent development.

ASRC 2100 Swahili Literature @ (LA-AS)
Fall. 4 credits. Satisfies Option 1.
Prerequisite: ASRC 1102. A. Nani.
Students gain mastery over spoken Swahili and are introduced to the predominant Swahili literary forms.

ASRC 2103 Intermediate Yoruba II @ (also NES 2211, RELST 2204)
Spring. 4 credits. Satisfies Option 1.
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 of the language that will assist them in describing, presenting, and narrating information in the

ASRC 2106 Intro Quranic and Classical Arabic (also NES 2211, RELST 2204)
Fall. 4 credits. M. Younes.
For description, see NES 2211.

ASRC 2300 African Cultures and Civilizations @ (also CES 1120/2120)
Fall, spring, summer. 4 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 2306 The Past and Present of Pre-colonial Africa (also HIST 2550) @ (HA-AS)
Spring. 3 credits. S. Greene.
For description, see HIST 2550.

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, national independence, 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/social-scientific 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 of 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 I. M. Younes.
For description, see NES 3201/3202.

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, the Nile River Cultural Complex, Berber, Carthage and the 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 3501 Introduction to African Art (also ARTH 3510) @ (LA-AS) Fall. 3 credits. S. Hassan.
Survey of the visual and material cultural traditions of sub-Saharan Africa. Aims at investigating the different forms of visual artistic traditions in relation to their historical and sociocultural context. Explores the symbolism and complexity of traditional African art through the analysis of myth, ritual, and cosmology. Uses in-depth analysis of particular African societies to examine the relation of visual arts to indigenous concepts of time, space, color, form, and sociopolitical order. Also explores new and contemporary art forms associated with major socioeconomic changes and processes of assimilation and acculturation. These include tourist art, popular art, and elite art.

ASRC 3506 Introduction to Cultural Studies (also ENGL 3506) Spring. 3 credits. G. Farred.
Since it was first “founded” in the mid-1950s, in the aftermath of the troika of events that made 1956 famous, Cultural Studies has always proved difficult to define. This course does not directly seek to address what Cultural Studies is (a vexed and vexing question, an issue that is always negotiable as a method of knowledge production and utilization of knowledge, particularly emancipatory knowledge). The 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 is constituted in Africa and the Diaspora. The 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 is constituted in Africa and the Diaspora. The 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 the 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 our times in South 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 cinema.

ASRC 4504 Exhibiting Cultures (also ARTH 4508) (CA-AS)
Spring. 4 credits. C. Finley.
For description, see ARTH 4508.

ASRC 4506 Contemporary African Diaspora Art (also ARTH/VISST 4505)
Spring. 4 credits. C. Finley.
For description, see ARTH 4505.

ASRC 4526 Rastafari, Race, and Resistance (also ARTH 4525, VISST 4625)
Fall. 4 credits. P. Archer-Straw.
For description see ARTH 4525.

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. 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. After an introduction of the concepts of education and innovations and the stages of innovation as planned change, the course focuses on concrete historical and contemporary cases of educational innovations. The case studies in the United States include the creation and expansion of historically black institutions such as Lincoln University, Spelman College, Tuskegee Institute (now Tuskegee University), and other schools in the South, and the Westside Preparatory School in Chicago. The African cases studied include African languages for instruction with a focus on a Nigerian case, Ujamaa and education for self-reliance in Tanzania, and the case of Cote d’Ivoire, which adopted television as a medium of instruction.

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 non-westernized/precivilizational 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; women 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 transitioning to 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 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; gender, 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 and addressing 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. 4 credits. N. Assié-Lumumba.
The family, as a social institution, is structured according to historical, socioeconomic, political, and cultural factors. Course topics include the concepts of the nuclear and extended family, the roles, rights and obligations of different age groups and generations; and marriage and its related issues, including parenthood, child rearing, and gender roles. Other issues examined are reproductive health, family planning, sexuality and fertility (particularly during adolescence), family codes, and legal implications. The course deals also with structural change and continuity, the impact of urbanization, urbanization and formal education, and the contemporary economy on the structure and challenges of the family in Africa. Finally, the legacy of African family values and traditions in the African Diaspora, with a focus on the African-American Experience, is discussed.

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 4904 African Philosophy
Fall. 4 credits. G. Farred.
Thinking St. Augustine’s Confessions as a foundational text of and for Africana philosophy, thinking the Confessions in relation to the work of authors as diverse as Albert Camus and Abdelkebir Khattabi, thinking that thirstiest of issues, the “value” of African thought in a “globalized” or “neo-imperial” moment, are among the issues that this course will take up. The project here is not to establish a canon for Africana philosophy, as if such an articulation were possible anyway, but to read—as broadly as might be imagined—for philosophical trends or tendencies that are visible in the work of African thinkers—that is, thinkers who are both resident in and work from within the continent, and those who write about its philosophy. It is, however, to recognize why there might be a need for a “canon,” the intellectual and political forces that drive such a project, and the critical importance of a dialogic conversation between Africana philosophy and mainstream Continental or American philosophy. All of which is premised on the question: What is Africana philosophy? Is there, and how, indeed, could there not be, regional difference? What takes place in the spaces between? In those long historical moments between St. Augustine and contemporary Africana thinkers the history of Africana philosophy matters, but only, and especially, in so far as it helps in provoking questions about the philosophical text in itself.

ASRC 6205 Islam in Africa and Its Diaspora (also ASRC 4201, NES 6710)
Spring. 4 credits. A. Mazzui.
For description, see ASRC 4201.

ASRC 6205 Democracy/Limits of Citizenship (also ENGL 6205)
Fall. 4 credits. G. Farred.
This course is an investigation of the kinds of work—political, philosophical, theoretical, ethical—that the discourse of democracy and citizenship does in our historical moment. At a juncture when “democracy” is offered, everywhere its seems, as an elixir, the cure-all for political problems in every corner of the globe, this course intends to think democracy as, at once, an unfailingly and constitutionally necessary project—borrowing here, the considerable pressure from the work of Jacques Ranciere. Democracy is employed here as much as a critique of the violence done to human communities as it provides a way of interrogating how hegemonic the discourse—if not always the practice of democracy—in its many guises: human rights, “free and fair elections,” the franchise, and so—has become. Is human rights discourse simply represent strategies of authorization for the UN or the U.S.A. to intervene in the affairs of “sovereign” nations? Do events in the Darfur region in southern Sudan or the ethnic cleansing practiced by Serbs in the 1990s constitute so gross a violation against vulnerable constituencies as to merit invasion by foreign nations or entities (such as the UN or NATO)? What violence does human rights discourse sanction, what attacks on sovereignty does it authorize? What does “democracy” mean in those, and other, specific instances?

ASRC 6301 African American Politics (also ASRC 4300)
Fall. 4 credits. J. Turner.
For description, see ASRC 4300.

ASRC 6303 Nationalism and Decolonization in Africa
Spring. 4 credits. J. Byfield.
This course examines the rise of nationalism as well as the process and aims of decolonization in sub-Saharan Africa. It draws on films and a variety of primary and secondary materials in order to illuminate the complex and contested arenas from which African nationalism emerged. Throughout the course we will examine the ways in which race, ethnicity, gender, and class shaped the discourse of nationalism as well as nationalist strategies and agendas. We will also explore the ways in which the conflicts and tensions of the nationalist period continue to shape post-colonial state and society.

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 6510 Panafrikanism and Feminism
Fall, 4 credits. C. Boyce Davies.
This course examines the particular theoretical intersections of panafrikanism and feminism through a study of works which address the lives of activist women and men who lived political lives which demanded an articulation of this intersection. It will examine representative texts in each of these broad fields, paying particular attention to those works which explicitly address the intersection. Students will select and study the work of one thinker in either category and examine the written life from a few angles. In particular, we will be looking at the conflicts, disjunctures, and slippages between these positions; the possibilities and limitations as expressed by these thinkers; and the issues of collaboration, erasure articulated. Students will also have the opportunity to identify and discuss popular culture which addresses these themes.

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 outcomes 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 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 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.

AKKADIAN
See "Department of Near Eastern Studies."

AMERICAN STUDIES

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. 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 4800 course range (4803–4899) or an appropriately 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 4995, 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: A = Anthropology, Sociology, and Economics, LA = 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. Next offered 2009–2010. G. C. Abschuler.
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;
AMST 4301 The Rabino Seminar  
Fall. 4 credits. Prerequisite: permission of instructor. D. Chang.  
The Rabino 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 fall 2008: Port Cities in the Americas: Race, Migration, and Culture. This seminar offers an in-depth examination of American port cities, their populations, cultures, and economies. From the development of 18th-century northern seaports like Boston and Philadelphia, and slave societies of the Caribbean, from South American ports such as Cartagena, Colombia, to North American commercial capitals such as New Orleans and San Francisco, this course will examine the world of commerce, cultural interchange, labor, and race relations that characterize these cosmopolitan societies. Themes to be explored include the influence of transnational and oceanic histories and systems; the intersection of commerce, labor, and race; and cultural and social relations, particularly creolization. (HI)  

AMST 4305 Topics in American Studies (also GOVT 4051)  
Fall. 4 credits. Prerequisite: permission of instructor. D. Rubenstein.  
Topic for fall 2008: The Postmodern Presidency: Election 2008. This course will examine the presidencies of Reagan, G. H. W. Bush, Clinton, and G. W. Bush in relation to what scholars have called “the postmodern presidency.” While this term has been utilized by institutionalist students of the presidency as a periodizing hypothesis, our emphasis will be on the work of cultural critics and historians. We will address the slipperiness between fact and fiction in cinematic and popular representations of the presidency (biography, novels, television). The construction of gender normativity (especially masculinity) will be an attendant subtheme. The postmodern presidency will be read as a site of political as well as cultural contestation. The larger question of this approach to the presidency concerns the relationship between everyday life practices and citizenship as well as the role of national fantasy in American political culture today. (GP)  

AMST 4306 Topics in American Studies (also ARTH 4761)  
Fall and spring. 4 credits. Prerequisite: permission of instructor. Not open to freshmen. L. L. Meitner.  
Topic for fall 2008: Caricature. Political Cartoons, and Laughter. This seminar explores the place of caricatures and political cartoons in everyday life. Our focus is on modern images and their historical origins—the portrait cartoons, the grotesque, lowlife genre painting, physiognomic theory, and carnival. We will consider Leonardo, Bruegel, and Tiepolo as they influenced the moderns: Daumier, Hogarth, Gillray, Earsor, Dix, Grosz, Nast, the American socialists, WPA printmakers, and Dr. Seuss. Special attention to Goya and Los Desastres de la Guerra and Los Caprichos. Online resources include Cornell’s Collection of Political Americana. Some themes are street theatre and caricature; prints and mass circulation; social protest and satire; cartoonists and censorship. We will theorize lithography as a subversive medium, the double nature of the comic artist (dédoublément), the grotesque and utopic, caricature as history and high art, cartoon as text, and the social function of laughter. Students may relate these to present-day cartoonists and controversies. Readings include Baudelaire on caricature and modernity, Bakhtin on carnival and laughter, and Umberto Eco on ugliness. (MV)  

Topic for spring 2009: The Long 19th Century. Discusses the newest scholarship on the long 19th century—1789-1914—combining the methods of art history and visual culture. Using the body as an organizing principle, we will take a comparative approach to art as social production in England, Europe, and the U.S. Topics are framed by the French Revolution and World War I to include: the body as political state, social fragment, cultural appropriation, public body, gender construct, carnival, spectacle, archive, pathology, and anarch. We will theorize the modern gaze as dis-embodiment and look across media to include painting, print culture, world’s fairs, and popular entertainment. (MV)  

AMST 4310 Topics in American Studies: American Politics and Dissent, 1945 to 2000 (also HIST 4311)  
Fall. 4 credits. Permission of instructor required. 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)  

Courses  

AMST 1101 Introduction to American Studies # (CA-AJ)  
Spring. 4 credits. B. Maxwell.  
An examination of American 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 form in the 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. Fall. 2009–2010. 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. G. Altschuler. AMST 1530 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 2010 Popular Culture in the United States, 1900 to 1945 (HA-AS)  
Fall. 4 credits. G. Altschuler.
AMST 2150 Comparative American Literature (also COML 2150) (LA-AS)
Fall. 4 credits. B. Maxwell.
For description, see COML 2150. (LT)

AMST 2200 Travel in American History and Culture (also HIST 2200) (HA-AS)

AMST 2211 Seminar: The Blues and American Culture (also HIST 2211) (HA-AS)

AMST 2250 The U.S.-Mexico Border: History, Culture, Representation (also HIST/LSP 2250) (CA-AS)
Fall. 4 credits. M. C. Garcia.
For description, see HIST 2250. (HI)

AMST 2290 Jefferson and Lincoln (also HIST 2290) (HA-AS)

AMST 2300 Latino Communities (also DSOC/LSP 2300) (SBA-AS)
4 credits. Next offered 2009–2010. R. Mize. For description, see DSOC 2300 (ASE)

AMST 2350 Archaeology of North American Indians (also AIS 2350, ANTH/ARKEO 2235) (HA-AS)

AMST 2360 Native People of the Northeast (also AIS/HIST 2360) (HA-AS)

AMST 2390 Seminar in Iroquois History (also HIST 2390) (HA-AS)
Fall. 4 credits. Next offered 2009–2010. 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)
Fall. 4 credits. Prerequisite: permission of instructor. R. L. Moore.
For description, see HIST 2420. (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)
For description, see HIST 2510. (HI)

AMST 2510 20th-Century Women Writers (also ENGL/FGS 2510) (LA-AS)
For description, see ENGL 2510. (LT)

AMST 2520 Late 20th-Century Women Writers and Visual Culture (also ENGL 2520)
4 credits. Next offered 2009–2010. (LT)

AMST 2599 Latinos in the United States: Colonial Period to 1898 (also HIST/LSP 2600) (HA-AS)

AMST 2600 Introduction to American Indian Literature in the United States (also ENGL 2600) (LA-AS)

AMST 2610 Latinos in the United States: 1898 to the Present (also HIST/LSP 2610) (HA-AS)

AMST 2630 Asian American Literature (also AS/ENGL 2630) (LA-AS)
Spring. 4 credits. S. Wong.
For description, see ENGL 2630. (LT)

AMST 2640 Introduction to Asian American History (also AAS 2130, HIST 2640)

AMST 2660 Introduction to Native American History (also AIS/HIST 2660) (HA-AS)
Spring. 4 credits. J. Parmenter.
For description, see HIST 2660. (HI)

AMST 2680 Culture and Politics of the 1960s (also ENGL 2680) (CA-AS)
Fall. 4 credits. Next offered 2009–2010. P. Sawyer. (LT)

AMST 2710 Social and Political Context of American Education (also EDUC/SOC 2710) (SBA-AS)
Fall. 3 or 4 credits. J. Sipple.
For description, see EDUC 2710. (ASE)

AMST 2721 Anthropological Representation: Ethnographies of Latino Culture (also ANTH/LSP 2721) (CA-AS)

AMST 2730 Women in American Society, Past and Present (also FGSS/HIST 2730) (HA-AS)

AMST 2760 Survey of American Film (also FILM 2760, VISST 2300) (LA-AS)
Fall. 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 films shape 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/ENGRC 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)  
For description, see ILRCB 3030. (HI)

AMST 3030 African American Women in Slavery and Freedom (also FGSS 3070, HIST 3030) # (HA-AS)  
For description, see HIST 3030. (HI)

AMST 3031 Imagining America (also GOVT 3031) (CA-AS)  

AMST 3050 Americans Abroad (also FILM 3050)  
Focuses on how fiction and film, from the 19th century to the present, have depicted Americans abroad. (LT)

AMST 3060 History of American Workers: 19th century to the present, have depicted Americans abroad. (LT)

AMST 3090 The Cinema and the American City (CA-AS)  
The emergence of the cinema in the late 19th century coincided with the emergence of a new kind of metropolis, characterized by, among other things, new traffic systems (elevated train, subway, automobile); new racial, ethnic, and sexual regimes; and new urban planning. The cinema was inevitably affected by the ways in which the city developed, while at the same time it also made the city legible. In this course we examine how American cities and towns have been represented in film in different ways, as, for instance, musical symphonies, mysteries to be deciphered, or post-apocalyptic wastelands. We explore how gender, racial, ethnic, class, and sexual identities are negotiated in the modern, cinematic city. Screenings range from silent and early sound films, such as The Crowd and 1930s musicals, to contemporary cinema, such as Do the Right Thing and Blade Runner; our viewings are guided by readings in film and urban theory and history. (HI)

AMST 3111 Urban Politics (also GOVT 3111) (SBA-AS)  
Fall. 4 credits. M. Shefter.  
For description, see GOVT 3111. (GP)

AMST 3130 U.S. Foreign Relations, 1750–1912 (also HIST 3130) # (HA-AS)  

AMST 3140 History of American Foreign Policy 1812 to the Present (also HIST 3140) (HA-AS)  

AMST 3141 Prisons (also GOVT 3141) (SBA-AS)  
Fall. 4 credits. M. Katzenstein.  
For description, see GOVT 3141. (GP)

AMST 3161 The American Presidency (also GOVT 3161) (SBA-AS)  
Fall. 4 credits. M. E. Sanders.  
For description, see GOVT 3161. (GP)

AMST 3170 British–French North America (also HIST 3170) # (HA-AS)  
Fall. 4 credits. J. Parmenter.  
For description, see HIST 3170. (HI)

AMST 3171 Campaigns and Elections (also GOVT 3171) (SBA-AS)  
Fall. 4 credits. P. Enns.  
For description, see GOVT 3171. (GP)

AMST 3180 American Constitutional Development (also HIST 3180) (HA-AS)  

AMST 3181 The U.S. Congress (also GOVT 3181) (SBA-AS)  
Spring. 4 credits. M. Shetter.  
For description, see GOVT 3181. (GP)

AMST 3191 Racial and Ethnic Politics (also GOVT/LSP 3191)  

AMST 3210 Colonial North America to 1763 (also HIST 3210) # (HA-AS)  

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)  
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 late 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. (HI)

AMST 3241 Inequality and American Democracy (also GOVT 3241)  
Fall. 4 credits. S. Mettler.  
For description, see GOVT 3241. (GP)

AMST 3248 Iroquois Archaeology (also AIS/ANTHR/ARKEO 3248) # (HA-AS)  
Fall. 4 credits. K. Jordan.  
For description, see ANTHR 3248. (ASE)

AMST 3250 Age of the American Revolution, 1754 to 1815 (also HIST 3250) # (HA-AS)  

AMST 3270 Contemporary American Theatre (also THETR 3370) (LA-AS)  
Spring. 4 credits. S. Warner.  
For description, see THETR 3370. (LT)

AMST 3340 Recent American History, 1925 to 1965 (also HIST 3340) (HA-AS)  
Fall. 4 credits. R. Vanderlan.  
For description, see HIST 3340.

AMST 3410 Recent American History, 1965 to Present (also HIST 3410) (HA-AS)  
Spring. 4 credits. R. Vanderlan.  
For description, see HIST 3410. (HI)

AMST 3430 American Civil War and Reconstruction, 1860 to 1877 (also HIST 3430) # (HA-AS)  
Spring. 4 credits. Next offered 2009–2010. E. Baptist. (HI)

AMST 3450 Cultural and Intellectual Life of 19th-Century Americans (also HIST 3450) # (HA-AS)  
For description, see HIST 3450. (HI)

AMST 3460 Modernization of the American Mind (also HIST 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)  

AMST 3480 Film Noir (also FILM 3460, VISST 3480) (LA-AS)  
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)  
Spring. 4 credits. K. McCullough.  
For description, see ENGL 3480. (LT)

AMST 3550 Latinos, Law and Identity (also DSOC/LSP 3550) # (SBA-AS)  
Spring. 4 credits. R. Mize.  
For description, see DSOC 3550. (ASE)

AMST 3570 Engineering in American Culture (also ENGR/ENGRC/STS 3570, STS 3571)  
For description, see ENGR 3570. (HI)

AMST 3600 Another World Is Possible: The American Left Since the 1960s (also ENGL 3600)  

AMST 3650 U.S. Art from FDR to Reagan (also ARTH 3605) (LA-AS)  
For description, see ARTH 3605. (MV)

AMST 3670 Studies in the Formation of U.S. Literature: Emerson to Melville (also ENGL 3670) # (LA-AS)  
Spring. 4 credits. D. Fried.  
For description, see ENGL 3670. (LT)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Fall Semester</th>
<th>Spring Semester</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMST 3650</td>
<td>American Literature Since 1945 (also ENGL 3650) (LA-AS)</td>
<td>4</td>
<td>K. McCullough. (LT)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3655</td>
<td>Politics and Literature (also GOVT 3655) (LA-AS)</td>
<td>4</td>
<td>B. Maxwell. (LT)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3670</td>
<td>Studies in U.S. Fiction after 1900: 20th-Century American Fiction: Major Movements and Writers (also ENGL 3670) (LA-AS)</td>
<td>4</td>
<td>M. P. Brady; J. Braddock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3740</td>
<td>Painting in 19th-Century America (also ARTH 3740) # (CA-AS)</td>
<td>4</td>
<td>L. L. Meixner.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3750</td>
<td>Comparative Race and Ethnicity (also DSOC/LSP 3750) # (SBA-AS)</td>
<td>4</td>
<td>R. Mize</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3777</td>
<td>The United States (also ANTHR/LSP 3777) # (CA-AS)</td>
<td>4</td>
<td>V. Santiago-Frizary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3801</td>
<td>Asian American Urban Experience (also AAS/CRP 3801/6801, AMST 6801)</td>
<td>3</td>
<td>C. Lai</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3810</td>
<td>American Architecture and Building I (also ARCH 3810)</td>
<td>3</td>
<td>M. Woods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3811</td>
<td>American Architecture and Building II (also ARCH 3811)</td>
<td>3</td>
<td>M. Woods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3812</td>
<td>Edge Cities: Cellobium New York and Los Angeles (also ARCH/FILM/VISST 3812)</td>
<td>3</td>
<td>S. Haenni, M. Woods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3820</td>
<td>Poetry and Poetics of America (also COML/SPAN 3820)</td>
<td>4</td>
<td>J. Monroe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3911</td>
<td>Science in the American Polity, 1960 to Now (also GOVT 3091, HIST 3911) (SBA-AS)</td>
<td>4</td>
<td>J. Reppy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3930</td>
<td>International Film of the 1970s (also FILM/VISST 3930)</td>
<td>4</td>
<td>S. Haenni</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3970</td>
<td>Policing and Prisons in American Culture (also ENGL 3970)</td>
<td>4</td>
<td>T. Lowi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 3981</td>
<td>Latino/a Popular Cultural Practices (also ENGL/LSP 3980)</td>
<td>4</td>
<td>M. P. Brady</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 4030</td>
<td>Advanced Seminar in Poetry: A. R. Ammons (also ENGL 4030)</td>
<td>4</td>
<td>R. Gilbert</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 4032</td>
<td>Immigration and Politics Research Seminar (also GOVT/LSP 4032)</td>
<td>4</td>
<td>M. Jones-Correa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 4039</td>
<td>Reconstruction and the New South (also HIST 4390) # (HA-AS)</td>
<td>4</td>
<td>M. Woods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 4041</td>
<td>American Political Development in the 20th Century (also GOVT 4041/6121) (HA-AS)</td>
<td>4</td>
<td>E. Sanders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 4050</td>
<td>U.S.-Cuba Relations (also AMST 6050, HIST/LSP 4050/6050)</td>
<td>4</td>
<td>M. Jones-Correa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 4061</td>
<td>Politics of Slow-Moving Crises (also AMST/GOVT 6161, GOVT 4061)</td>
<td>4</td>
<td>E. Sanders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 4113</td>
<td>Race, Technology, and Visuality (also AAS 4130, ARTH 4113)</td>
<td>4</td>
<td>T. Tu</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 4241</td>
<td>Contemporary American Politics (also AMST 6291, GOVT 4241/6291)</td>
<td>4</td>
<td>M. Shefter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 4260</td>
<td>The West and Beyond: Frontiers and Borders in American History and Culture (also HIST 4260) (HA-AS)</td>
<td>4</td>
<td>T. Lowi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 4261</td>
<td>Commodification in Historical Perspective: Sex, Rugs, Salt, and Coal (also HIST 4261) # (HA-AS)</td>
<td>4</td>
<td>A. Sachs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 4272</td>
<td>Historical Archaeology of Indigenous Peoples (also AMST 6272, ANTHR/ARKEO 4272/7272) # (HA-AS)</td>
<td>4</td>
<td>K. Jordan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMST 4281</td>
<td>Government and Public Policy: An Introduction to Analysis and Criticism (also AMST 6281, GOVT 4281/7281) (SBA-AS)</td>
<td>4</td>
<td>T. Lowi</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
AMST 4440 American Men (also FGSS 4450, HIST 4440)
4 credits. Next offered 2009-2010.
E. Baptist. (HI)

AMST 4508 Exhibiting Cultures (also AMST 6508, ARTH 4508/6508, ASRC 4504/6504) (CA-AS)
4 credits. Next offered 2009-2010.
C. Finley.
For description, see ARTH 4508. (MV)

AMST 4509 Black Arts Movement (also ARTH 4509/6509, AMST 6509) (CA-AS)
4 credits. Next offered 2009-2010.
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)
Fall. 4 credits. S. Wong.
For description, see ENGL 4530. (LT)

AMST 4585 American Political Thought (also AMST 6585, GOVT 4585/6585) (HA-AS)
For description, see GOVT 4585. (GP)

AMST 4600 Melville (also ENGL 4600) (LA-AS)
Fall. 4 credits. B. Maxwell.
For description, see ENGL 4600. (LT)

AMST 4616 Interpreting Race and Racism: DuBois (also GOVT 4616)
4 credits. Next offered 2009-2010.
A. M. Smith.
For description, see GOVT 4616. (GP)

AMST 4625 Sexuality and the Law (also AMST 6625, FGSS 4610/7620, GOVT 4625/7625) (KC-MAS)
4 credits. Next offered 2009-2010.
A. M. Smith.
For description, see GOVT 4625. (GP)

AMST 4635 Feminist Theory/Law and Society (also GOVT 4635) (CA-AS)
4 credits. Next offered 2009-2010.
A. M. Smith.
For description, see GOVT 4635. (GP)

AMST 4660 Iroquois History (also AIS/HIST 4660) (HA-AS)

AMST 4662 Contemporary American Indian Poets (also ENGL 4662)
Fall. 4 credits. E. Cheyfitz.
For description, see ENGL 4662. (LT)

AMST 4690 Faulkner (also ENGL 4690)
4 credits. Next offered 2009-2010. K. Attell. (LT)

AMST 4750 Seminar in Cinema I (also FILM 4750) (LA-AS)
Fall. 4 credits. D. Fredericksen.
For description, see FILM 4750. (LT)

AMST 4780 Intersections in Lesbian Fiction (also ENGL 4780, FGSS 4770) (LA-AS)
4 credits. Next offered 2009-2010.
K. McCullough. (LT)

AMST 4790 Gender and Visual Culture in Women's Literature (also ENGL/FGSS 4790; VISST 4800)
Fall. 4 credits. S. Samuels.
For description, see ENGL 4790. (LT)

AMST 4809 Politics of '70s Film (also GOVT 4809) (SBA-AS) Spring. 4 credits. J. Kishner.
For description, see GOVT 4809. (GP)

AMST 4813 Environments and Waterscapes (also HIST/SHUM 4813; BSOC/STS 4381)
Fall. 4 credits. A. Sachs.
For description, see HIST 4813. (HI)

AMST 4821 Religious and Secular in American Culture (also HIST 4821) (HA-AS)
Fall. 4 credits. R. L. Moore.
For description, see HIST 4821. (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 4900 New World Encounters, 1500 to 1800 (also AIS/HIST 4900) (HA-AS)
Fall. 4 credits. J. Parmenter.
For description, see HIST 4900. (HI)

AMST 4970 Jim Crow and Exclusion-Era America (also AAS 4970, AMST 6970, HIST 4970/6970) (HA-AS)
Fall. 4 credits. Next offered 2009-2010. D. Chang. (HI)

AMST 4997 Research Seminar in American Studies (also HIST 4997) Fall or spring. Offered in Cornell in Washington Program only. S. Blumín and others.
For description, see HIST 4997. (HI)

AMST 4998 Politics and Policy: Theory, Research, and Practice (also ALS/CAPS/GOV'T 4998) 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 2719/5710)
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 2009-2010.
M. C. Garcia. (HI)

AMST 6101 African-American Historiography (also HIST 6101)
4 credits. Next offered 2009-2010.
M. Washington. (HI)

AMST 6121 American Political Development in the 20th Century (also AMST/HIST 4041/6121)
Fall. 4 credits. E. Sanders.
For description, see GOVT 4041. (GP)

AMST 6142 Causes and Consequences of U.S. Foreign Policy (also AMST/GOVT 4142)
Spring. 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 2009-2010.
M. Jones-Correa.
For description, see GOVT 4061. (GP)

AMST 6202 Political Culture (also GOVT 6202)
4 credits. Next offered 2009-2010.
R. Bensel.
For description, see GOVT 6202. (GP)

AMST 6248 Iroquois Archaeology (also AIS/ANTH/ARKEO 6248) Fall. 4 credits. K. Jordan.
For description, see ANTHR 6248. (ASE)

AMST 6272 Historical Archaeology (also AMST 4272, ANTHR/ARKEO 4272/7272)
4 credits. Next offered 2009-2010.
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 4291, GOVT 4291/6291) Spring. 4 credits. M. Shifter.
For description, see GOVT 4291. (GP)

AMST 6301 Institutions (also GOVT 6301)
4 credits. Next offered 2009-2010.
R. Bensel.
For description, see GOVT 6301. (GP)

AMST 6424 Ethnoracial Identity in Anthropology, Language, and Law (also ANTHR/LSIP 6424, LAW 7231) Spring. 4 credits. V. Santiago-Irizarry.
For description, see ANTHR 6424. (ASE)

AMST 6509 Black Arts Movement (also AMST 4509, ARTH 4509/6509, ASRC 4505/6509) Fall. 4 credits. Next offered 2009-2010.
C. Finley.
For description, see ARTH 4509. (MV)

AMST 6550 Early Modern Atlantic World (also HIST 6550) Spring. 4 credits. Next offered 2010-2011.
M. B. Norton. (HI)

AMST 6625 Sexuality and the Law (also AMST 4625, FGSS 4610/7620, GOVT 4625/7625) 4 credits. Next offered 2009-2010.
A. M. Smith.
For description, see GOVT 4625. (GP)

For description, see ENGL 6631. (LT)

AMST 6645 Democratic Theory (also GOVT 6645) Fall. 4 credits. 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, FGSS 6690) Spring. 4 credits. S. Samuels.
For description, see ENGL 6690. (LT)
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 (FWS) may count toward the major. A letter grade of C– or better is required in all courses counted toward the major.

The Cornell–Nepal Study Program: 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 Research 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 3.5 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 second 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 ethnohistorical 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. J. Henderson.
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 (PB Supplementary List)

Spring. 3 credits. Fee for lab usage and maintenance, $5. M. Small.
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. K. Dill.
An introduction to cultural anthropology through ethnographies, or the descriptive accounts of anthropologists. Through readings and discussions, students are acquainted 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.

This course is intended for majors in anthropology, prospectives majors. Each week a different member of the faculty in anthropology will give 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. Fiskejö.
This course will introduce students to the meaning and significance of forms of cultural diversity for our 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 economies, kinship, religion, and politics, as well as interconnections and dependencies between world areas (e.g., Africa, Latin America, the West). Among the issues considered are: correctness and truth; nationalism 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. As 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 non-western 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 comprehension of 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. Fiskejö.
For description, see Introductory Courses.

ANTHR 2428 Slavery and Human Trafficking (CA-AS)


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 the 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 sociology 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 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 2009–2010. 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]

ANTHR 3000 Introduction to Anthropological Theory (CA-AS)
Fall. 4 credits. D. Boyer.
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. The course especially aims to help students develop conceptual and analytical tools for making sense of human social experience and cultural capacities.

[ANTHR 3046 Gifts and Exchange]

[ANTHR 3410 Nationalism and Revivalism (CA-AS)]

ANTHR 3420 Myth, Ritual, and Symbol (also RELST 3230) (CA-AS)
Spring. 4 credits. Comparative Survey. J. Fajans.
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 non-specialists in producing these cultural forms.

ANTHR 3421 Sex and Gender in Cross-Cultural Perspective (also FGSS 3210) (CA-AS)
Fall. 4 credits. Comparative Survey. K. Dillin. Introduction to the study of sex roles cross-culturally and the 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 3428 Conflict, Dispute Resolution, and Law in Cultural Context (SBA-AS)]

ANTHR 3447 Sport (CA-AS)

ANTHR 3451 Global Movements of Cultural Heritage (CA-AS)
Spring. 4 credits. Comparative Survey. M. Fiskejos.
In this course we explore “cultural heritage” as an idea, and as objects which change hands across continents. Our focus is the global trade of fragments of monuments, statues, tomb furnishings and other antiquities derived from poorer areas of the world, ranging from Benin and Afghanistan to China and Cambridge, transferred to collectors and museums in wealthier countries. We use anthropological perspectives to explore a range of issues such as contested spoils of war, looting and international law, auctions and collecting, value and representation, as well as the role of knowledge, the academy, and world public opinion.

[ANTHR 3479 Culture, Language, and Thought (CA-AS)]

[ANTHR 3514 Learning in Japan (SBA-AS)]

[ANTHR 3516 Power, Society, and Culture in Southeast Asia (CA-AS)]

ANTHR 3545 Peoples and Cultures of the Himalayas (also ANTHR 7455) (CA-AS)
Spring. 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 (also ASIAN 3345)]

[ANTHR 3554 Male and Female in Chinese Culture and Society (also FGSS 3440) (SBA-AS)]

ANTHR 3703 Asians in the Americas: A Comparative Perspective (also ASIAN 3303) (CA-AS)
Fall. 4 credits. V. Munasinghe.
The common perception of ethnicity is that it is a “natural” and an inevitable consequence of cultural difference. “Asians” overseas, in particular, have won repute as a people who cling tenaciously to their culture and refuse to assimilate into their host societies and cultures. But, who are the “Asians”? On what basis can we label “Asians” an ethnic group? Although there is a significant Asian presence in the Caribbean, the category “Asian” itself does not exist in the Caribbean. What does this say about the nature of categories that label and demarcate groups of people on the basis of alleged cultural and phenotypical characteristics? This course examines the dynamics behind group identity, namely ethnicity, by comparing and contrasting the multicultural experience of Asian populations in the Caribbean and the United States. Ethnographic case studies focus on the East Indian and Chinese experiences in the Caribbean and the Chinese, Korean, Japanese, Filipino, and Indian experiences in the United States.

ANTHR 3777 The United States (also AMST/LSP 3777) (CA-AS)
Fall. 4 credits. V. Santiago-Irizarry.
The anthropological inquiry into one’s own culture is never a neutral exercise. This course will explore issues in the cultural construction of the United States as a “pluralistic” society. We will look at the ideological context for the production of a cultural profile predicted upon ideas that are intrinsic to American images of identity such as individualism, freedom, and equality and the way these are applied in practice. The course readings will include historic documents and accounts, popular writing, and recent ethnographies on the United States.

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. H. Miyazaki.
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)]

[ANTHR 4406 The Culture of Lives (also FGSS 4060) (CA-AS)]

[ANTHR 4426 Ideology and Social Production (also ANTHR 7426) (SBA-AS)]

[ANTHR 4429 Anthropology and Psychoanalysis (also ANTHR 7429) (SBA-AS)]
Fall. 4 credits. Next offered 2009–2010. S. Sangren.]
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. J. Henderson.
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 enlightened 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)

ANTHR 2215 Stone Age Art (also ARKEO 2215) # (CA-AS)
Fall. 3 credits. T. Volman.
When did “art”, however defined, appear during the human career, how was it produced and for what purposes? These are some of the questions we will investigate through a survey of the discovery, validation, analysis and interpretation of the earliest art. The course will cover a variety of finds from the Old World, including the well-known cave art of southwestern France and northern Spain, and also consider portable art and decoration. The contributions of new analytical techniques and interpretive approaches are highlighted.

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 2230 Historical Archaeology (also ARKEO 2230) # (HA-AS)
Spring. 3 credits. F. Gleach.
Historical archaeology attempts to bring textual and archaeological data to bear on questions of the past. In practice this can mean many different approaches, to studying some that are not traditionally termed “historical archaeology”. This course explores the range of such efforts, asking questions like, What kinds of sites/contexts/data are amenable? What are the implications of the term “historical archaeology” itself? What has been and can be learned using these approaches?

ANTHR 2235 Archaeology of North American Indians (also AIS/AMST 2350, ARKEO 2235) # (HA-AS)

ANTHR 2255 Great Empires of the Andes (also ARKEO 2255) # (HA-AS)
Summer only. 3 credits. Next offered 2010. M. Malpass.

ANTHR 3217 Stone Age Archaeology (also ARKEO 3217) # (HA-AS)
Fall. 4 credits. Comparative Survey. T. Volman.
A survey of current approaches to the archaeological record of Stone Age peoples, from the earliest sites to those of recent times. Case studies are used to illustrate the nature of archaeological occurrences, excavation procedures, and analytical methods. Multidisciplinary efforts to expand our knowledge of prehistoric lifeways and behaviors are a major concern of the course.

ANTHR 3230 Humans and Animals (also ARKEO 3230) # (CA-AS)

ANTHR 3232 Politics of the Past (also ARKEO 3232) # (HA-AS)
ANTHR 3248 Iroquois Archaeology (also ARKEO 3248/6248, ANTHR 6248) # (HA-AS)  
Fall. 4 credits. K. Jordan.  
This course surveys the long-term development of modem Iroquois (Haudenosaunee) culture from an archaeological perspective. Issues examined will include the geographic origins of the Iroquois; material culture, settlement, and subsistence; the founding of the Iroquois Confederacy; Iroquois responses to European-borne diseases, the fur trade, and territorial encroachment; the practicalities of doing Indian archaeology in New York State; and contemporary Haudenosaunee perspectives on archaeology. The Six Nations Iroquois will be emphasized, with some material drawn from surrounding Northern Iroquoian groups. Visits to local archaeological sites and museum collections will supplement classroom instruction.  

ANTHR 3255 Ancient Mexico and Central America (also ARKEO 3255) # (HA-AS)  
Fall. 4 credits. J. Henderson.  
A survey of the cultural history of ancient Mexico and Central America, emphasizing Aztec and Maya civilizations. The use of ethnographic and historical information to enrich archaeological interpretation is a general theme. Specific topics include the emergence of settled farming life, the rise of civilization and the state, and the development of mechanisms that linked the many societies in the region into a single sphere of interaction.  

ANTHR 3256 Archaeology of the Andes (also ARKEO 3256) # (HA-AS)  

ANTHR 3269 Gender and Age in Archaeology (also ANTHR 6269, ARKEO 3269/6269, FGSS 3700/6700) (SBA-AS)  

ANTHR 3270 Environmental Archaeology (also ANTHR 6270, ARKEO 3270/6270) (PBS Supplementary List)  

ANTHR 3272 Hunters and Gatherers (also ANTHR 6272, ARKEO 3272/6272) # (SBA-AS)  

ANTHR 4066 Identification and Interpretation of Archaeological Artifacts (also ARKEO 4066) (HA-AS)  
Fall. 4 credits. P. Glueck.  
How do we make sense of assemblages of archaeological artifacts? Stone tools, pottery, glass, metal; archaeological materials do not simply tell us what they mean. Knowledge of artifact types and classifications—classic typology and nomenclature—provides the foundation, to which theoretical and experimental models can then be added. Beginning with theories of classification, this course will introduce students to several archaeological typologies and their applications, and to some of the theoretical perspectives developed for further interpretation. The Anthropology Collections will be available, or students can bring material from their own research. This course is intended primarily for senior anthropology and archaeology majors.  

ANTHR 4256 Mesoamerican Religion, Science, and Society (also ARKEO 4256, LATA 4250) # (CA-AS)  

ANTHR 4258 Archaeological Analysis (also ANTHR 4258, ARKEO 4258) (SBA-AS)  
Spring. 4 credits. Limited to 15 students. Prerequisite: archaeology course or permission of instructor. Next offered 2010–2011. J. Henderson.  

ANTHR 4260 Field and Analytical Methods in Archaeology (also ARKEO 4260) # (SBA-AS)  
Spring. 4 or 6 credits. K. Jordan.  
This course provides a hands-on introduction to field, laboratory, and analytical methods in archaeology, focusing on historic-period American Indian sites in the Finger Lakes region. Students collectively will generate new archaeological data, beginning the semester with study of an under-considered archaeological museum collection, and moving to survey and excavation at an archaeological site as the weather permits. Students will have an opportunity to formulate and test their own research designs in laboratory and field settings. Readings will provide an in-depth immersion into field and laboratory methodology, research design, and the culture history and material culture typologies appropriate to the site and era. In addition to laboratory and field work, students will write a 15-page term paper based on original data which can draw on museum collections, field data, documentary sources, or a combination of these sources. Most class time will be spent off-campus; transportation will be arranged by the instructor.  

ANTHR 4262 Catalhoyuk and Contemporary Archaeological Practice (also ANTHR/ARKEO 7262, ARKEO 4262) # (HA-AS)  

ANTHR 4263 Zooarchaeological Method (also ARKEO 4263) (PBS Supplementary List)  

ANTHR 4264 Zooarchaeological Interpretation (also ARKEO 4264) (PBS Supplementary List)  
Spring. 4 credits. Prerequisite: permission of instructor. Next offered 2009–2010. N. Russell.  

ANTHR 4267 Origins of Agriculture (also ARKEO 4267) # (HA-AS)  

ANTHR 4268 Myth, History, and Politics: The Aztecs and Their Empire (also ANTHR/ARKEO 7268, ARKEO 4268)  
Spring. 4 credits. J. Henderson.  
Examines the structure and history of the largest polity in ancient Mexico, the “empire” of the Aztecs, using descriptions left by Spanish invaders, accounts written by Aztecs under Colonial rule, and archaeological evidence. Explores Aztec visions of the past, emphasizing the roles of myth, religion, and identity in Aztec statecraft and the construction of history.  

ANTHR 4270 Political Economy in Archaeology (also ANTHR/ARKEO 7270, ARKEO 4270) # (SBA-AS)  
Fall. 4 credits. K. Jordan.  
Political economy is a theoretical approach that emphasizes power relations, social tensions and contradictions, and how they mediate access to wealth and basic resources. This seminar explores applications of political-economic theory in archaeological analysis. The course begins with some key approaches to political economy within sociocultural anthropology to assess how these works can (and cannot) assist the archaeologist in constructing an archaeological evidence. Particular attention will be paid to questions of methodology: do certain field or analytical techniques facilitate or hinder political-economic interpretations? Case studies apply political-economic approaches to past societies at a variety of analytic and social scales, illustrating the intersection between archaeological political economy and issues of culture change, domination and resistance, ideology, gender, and agency.  

ANTHR 4272 Historical Archaeology of Indigenous Peoples (also AMST 6272, ANTHR/ARKEO 7272, ARKEO/AMST 4272) # (HA-AS)  

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 non-modern 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. M. Small.
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. D. Boyer.
For description, see Sociocultural Anthropology.

**ANTHR 3305 Anthropology of Parenting**
Spring. 4 credits. M. Small.
Human children are packets of genes that represent individual reproductive success. Like all animals, humans are selected by evolution to care for their offspring, but human infants and children require more intense parental investment than the offspring of most other species. Why is this so? Human parents are also influenced by cultural belief systems and ideology that play out in parenting styles. How do various belief systems influence parent-offspring interaction? In this course we will examine the human infant as a biologically designed organism that has co-evolved with caretakers, and then look at the various parenting styles across cultures that also mold our young.

**ANTHR 3375 Evolutionary Theory and Human Behavior (also ANTHR 6375)**
Spring. 4 credits. Comparative Survey. M. Small.

**ANTHR 3390 Primate Behavior and Ecology (PBS Supplementary List)**

**ANTHR 4390 Topics in Biological Anthropology**
Spring. 4 credits. Prerequisites: ANTHR 1300, 3390, or permission of instructor. Next offered 2009–2010. A. Clark Arcadi.
Current topics in biological anthropology are explored. Topics change each semester. For further information, contact the professor or department office.

**ANTHR 4910 Independent Study: Undergraduate 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: Undergraduate 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, 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.

**V. Honors, Field Research, and Independent Study**

**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/Anthrop/. 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 semester, 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 venerate 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**
Spring. 6 credits. A. Willford.
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, semiotics, etc., the course investigates how identity, meaning, and cultural forms 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, Sahlin, among others, as well as contemporary theories are given careful attention.

**ANTHR 6010 Proseminar: Social Organization**
Fall. 6 credits. D. Boyer.
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 controversy has been more mainly philosophical, in anthropology, these issues have developed in ethnographic analyses. The course briefly synthesizes kinship theory and economic anthropology with a focus on implications for general issues in social theory. Discussion of attempts to develop dialectical theories 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 anthropology 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. K. Jordan.
For description, see ANTHR 3248.

ANTHR 6256 Maya History (also ARKEO 6256)

ANTHR 6258 Archaeological Analysis (also ANTHR 4258, ARKEO 4258/6258)

ANTHR 6269 Gender and Age in Archaeology (also ANTHR/ARKEO 3269, ARKEO 6269, FGSS 6700)

ANTHR 6270 Environmental Archaeology (also ANTHR 3720, ARKEO 3270/6270)

ANTHR 6272 Hunters/Gatherers Past/ Present (also ANTHR 3272, ARKEO 3272/6272)
For description, see ANTHR 3272.

ANTHR 6371 Palaeoanthropology of South Asia (also ASIAN 6671, BIOEE 6710)

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 2009–2010. K. A. R. Kennedy.

ANTHR 6375 Evolutionary Theory and Human Behavior (also ANTHR 3375)

ANTHR 6403 Ethnographic Field Methods (also ANTHR 4403)

ANTHR 6421 Gender and Culture (also FGSS 6310)

ANTHR 6424 Ethnoracial Identity in Anthropology, Language, and Law (also AMST/LSP 6424)
Spring. 4 credits. V. Santiago-Irizarry. This course examines the role that both law and language, as mutually constitutive mediating systems, occupy in constructing ethnoracial identity in the United States. We approach the law from a critical anthropological perspective, as a signifying and significant sociocultural system rather than as an abstract collection of rules, norms, and procedures, to examine how legal processes and discourses contribute to processes of cultural production and reproduction that contribute to the creation and maintenance of differential power relations. Course material draws on anthropological, linguistic, and critical race theory as well as ethnographic and legal material to guide and document our analyses.

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

ANTHR 6452 Evidence: Ethnography and Historical Method

ANTHR 6479 Technocracy: Anthropological Approaches

ANTHR 6480 Anthropology and Globalization (also ANTHR 4480)
Fall. 4 credits. Next offered 2009–2010. Staff.

ANTHR 6482 Perspectives on the Nation
Spring. 4 credits. V. Munasinghe. This course will critically examine the key texts that have informed our understanding of the nation and nationalism. Beginning with some of the founding texts such as Hahn Koh’s “The Idea of Nationalism: A Study in its Origins and Backgrounds” (1994), Plamenatz’s “Two Types of Nationalism” (1976), and Renan’s “What is a Nation” (1939), we will then move on to more contemporary writings by Gellner, Hobshawn, and Anderson, and end with alternate analytical approaches that have been informed by the “national question” in the “Third World” such as Partha Chatterjee’s “Nationalist Thought and the Colonial World.” A central theme will be how notions of culture, power, and history are implicated in constructions of “the Nation.” We will also explore the possibilities of an ethnographic approach to the nation and ask if such an analytical/methodological move may help us better grapple with the perplexing emotion of nationalisms. The intersection of gender and nation will also form a section of this course.

ANTHR 6542 Violence, Symbolic Violence, Terror and Trauma in South Asia and the Himalayas (also ANTHR 4542)

ANTHR 6543 Chinese Ethnology

ANTHR 7000 Development of Anthropological Thought (also ANTHR 4000)
Fall. 4 credits. H. Miyazaki.
For description, see ANTHR 4000.

ANTHR 7262 Catalhoyuk and Archaeological Practice (also ANTHR 4262)

ANTHR 7268 Myth, History, and Politics: The Aztecs and Their Empire (also ANTHR/ARKEO 4268, ARKEO 7268)
Spring. 4 credits. J. Henderson.
For description, see ANTHR 4268.

ANTHR 7270 Political Economy in Archaeology (also ANTHR 4270, ARKEO 4270/7270)
Fall. 4 credits. K. Jordan.
For description, see ANTHR 4270.

ANTHR 7272 Historical Archaeology of Indigenous Peoples (also AMST 6272, AMST/ARKEO 4272, ARKEO 7272)

ANTHR 7426 Ideology and Social Production (also ANTHR 4426)

ANTHR 7429 Anthropology and Psychoanalysis (also ANTHR 4429)

ANTHR 7437 Anthropology of Development (also ANTHR 4437)

ANTHR 7444 God(s) and the Market (also ANTHR 4444)

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)
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)
Spring. 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

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 archaeology through 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. J. Henderson. 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. Graduate students pursue advanced topics of particular interest under the guidance of a faculty member(s).
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Credits</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARKEO 3200</td>
<td>Early People: The Archaeological and Fossil Record</td>
<td>(also ANTHR 2200)</td>
<td>3</td>
<td>Fall 2009–2010, J. Henderson.</td>
</tr>
<tr>
<td>ARKEO 3200</td>
<td>Early Agriculture</td>
<td>(also ANTHR 2201)</td>
<td>3</td>
<td>Fall 2009–2010, N. Russell.</td>
</tr>
<tr>
<td>ARKEO 3215</td>
<td>Stone Age Art</td>
<td>(also ANTHR 2215)</td>
<td>3</td>
<td>Fall 2009–2010, M. Malpass.</td>
</tr>
<tr>
<td>ARKEO 3220</td>
<td>Field Course in Iroquois Archaeology</td>
<td>(also ANTHR 2220)</td>
<td>3</td>
<td>Summer 2009–2010, K. Jordan.</td>
</tr>
<tr>
<td>ARKEO 3220</td>
<td>Historical Archaeology</td>
<td>(also ANTHR 2230)</td>
<td>3</td>
<td>Fall 2009–2010, T. P. Volman.</td>
</tr>
<tr>
<td>ARKEO 3225</td>
<td>Great Empires of the Andes</td>
<td>(also ANTHR 2255)</td>
<td>3</td>
<td>Fall 2009–2010, T. P. Volman.</td>
</tr>
<tr>
<td>ARKEO 3217</td>
<td>Stone Age Archaeology</td>
<td>(also ANTHR 3217)</td>
<td>4</td>
<td>Fall 2009–2010, T. P. Volman.</td>
</tr>
<tr>
<td>ARKEO 3230</td>
<td>Humans and Animals</td>
<td>(also ANTHR 3230)</td>
<td>4</td>
<td>Fall 2009–2010, N. Russell.</td>
</tr>
<tr>
<td>ARKEO 3232</td>
<td>Politics of the Past</td>
<td>(also ANTHR 3233)</td>
<td>4</td>
<td>Fall 2009–2010, N. Russell.</td>
</tr>
<tr>
<td>ARKEO 3248</td>
<td>Iroquois Archaeology</td>
<td>(also AIS 3428/6428, AMST/ANTHR/ARKEO 6248)</td>
<td>4</td>
<td>Fall 2009–2010, T. P. Volman.</td>
</tr>
<tr>
<td>ARKEO 3255</td>
<td>Ancient Mexico and Central America</td>
<td>(also ANTHR 3255)</td>
<td>4</td>
<td>Fall 2009–2010, J. Henderson.</td>
</tr>
<tr>
<td>ARKEO 3256</td>
<td>Archaeology of the Andes</td>
<td>(also ANTHR 3256)</td>
<td>4</td>
<td>Fall 2009–2010, J. Henderson.</td>
</tr>
<tr>
<td>ARKEO 3269</td>
<td>Gender and Age in Archaeology</td>
<td>(also ANTHR 3269/6269, ARKEO 3269, FGSS 3700/6700)</td>
<td>4</td>
<td>Fall 2009–2010, J. Henderson.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>III. Classical, Near Eastern, and Medieval Archaeology</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARKEO 2661</td>
</tr>
<tr>
<td>ARKEO 2663</td>
</tr>
<tr>
<td>ARKEO 2668</td>
</tr>
<tr>
<td>CLASS 2700</td>
</tr>
<tr>
<td>ARKEO 2728</td>
</tr>
<tr>
<td>ARKEO 2743</td>
</tr>
<tr>
<td>ARKEO 2765</td>
</tr>
<tr>
<td>ARKEO 3651</td>
</tr>
<tr>
<td>ARKEO 3665</td>
</tr>
<tr>
<td>ARKEO 3666</td>
</tr>
<tr>
<td>ARKEO 3730</td>
</tr>
<tr>
<td>ARKEO 3731</td>
</tr>
<tr>
<td>ARKEO 3800</td>
</tr>
<tr>
<td>ARKEO 4644</td>
</tr>
</tbody>
</table>
ARKEO 6644 Archaeology of the Ugarit (also ARKEO/JWST/INES 4644, INES/JWST 6644) Spring. 4 credits. C. Monroe. For description, see INES 4644.

ARKEO 6666 History and Archaeology of the Ancient Near East (also ARKEO/JWST/INES 3666, JWST/INES 6666) Fall. 4 credits. D. Owen. For description, see INES 3666.

ARTH 3202 Arts of the Roman Empire (also CLASS 3740) Spring. 4 credits. A. Ramage.

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 2728 Art and Archaeology in the Ancient Mediterranean World (also ARTH 2227, CLASS 2727) Fall. 4 credits. Basic. Next offered 2009–2010. S. Manning.]

[ARKEO 2756 Practical Archaeology (also CLASS 2756)]

ARKEO 2610 Urban Archaeology (also CRP/ILA 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. As a special interest area, maritime archaeology explores the development of humankind by exposing and examining the cultural artefacts that our ancestors have left us throughout the coastal zone; both along the foreshore and underwater. Coastal settlements, midden deposits, and shipwreck sites are perhaps the more obvious indicators of this rich material assemblage, while island communities invariably combine all three elements to present exceptionally important case studies for research. 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. Today, such archaeology is also intrinsically integrated with environmental/biological science and with GIS approaches to data recording. Remote-sensing technology (including side-scan sonar) have come to enhance the survey capabilities of all projects and permit unprecedented access to the seabed. 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 will participate in active fieldwork, which will include preshore study and underwater exploration, the results of which will lay the basis for a long-term analysis of the archaeological potential that surrounds the islands on and under water.

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) 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) Spring. 4 credits. Next offered 2009–2010. T. P. Volman.]


[ARKEO 4258 Archaeological Analysis (also ANTHR 4258/6258, ARKEO 6258) Spring. 4 credits. Limited to 15 students. Prerequisite: archaeology course or permission of instructor. Next offered 2010–2011. J. S. Henderson.]

ARKEO 4260 Field and Analytical Methods in Archaeology (also ANTHR 4260) Spring. 4 or 6 credits. K. Jordan. For description, see ANTHR 4260.

[ARKEO 4263 Zooarchaeological Method (also ANTHR 4263) (PBS Supplementary List) Fall. 5 credits. Next offered 2009–2010. N. Russell.]

[ARKEO 4264 Zooarchaeological Interpretation (also ANTHR 4264) (PBS Supplementary List) Spring. 4 credits. Prerequisites: ANTHR/ARKEO 4263; permission of instructor. Next offered 2009–2010. 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 Paleoclimatology (also EAS 4600) Fall. 4 credits. M. Goman. For description, see EAS 4600.

ARKEO 4903 Methods in the Study of the Ancient Near East (also JWST/INES 4903) Spring. 4 credits. D. Owen. For description, see INES 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 6270) Fall. 4 credits. T. P. Volman.

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 2009–2010.]

[BIOEE 6710 Paleoanthropology of South Asia (also ANTHR 6371, ASIAN 6672) Fall. 5 credits. Next offered 2010. K. A. R. Kennedy.]

V. Relevant Courses at Ithaca College

Contact Sherene Baugher in Landscape Architecture at sshb@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.


World Prehistory. J. Rossen. Every semester.


Ethnoarchaeology. J. Rossen. Every other year.

Archaeological Field School.
ASIAN STUDIES

R. McNeal, chair (350 Rockefeller Hall, 259-5055); A. Blackburn, B. Blesee;
D. Boucher, T. Chaloemtiarana, M. Chapman, J. Choi, 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;
M. Suzuki, K. Taylor, Q. Teng, T. Tranviet, S. Tun, D. X. Wu, K. Zhang, Emeritus;
K. Brazell, T. L. Mei, J. Wolf; 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. Murasinghe, V. Nee;
A. Nelson, 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 courses under our General Education heading. Asian Studies courses through the 4000 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 Asian 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 courses in Asian language at the 2000 level or above and in addition to this, 30 Asian Studies credits (which may include up to 6 additional credits of language study) from courses numbered 2000 and above and including at least one from two of our Asian Studies categories of “Literature and Linguistics,” “Religion,” and “Society and Culture”; at least one course at the 3000 level; and at least one course at the 4000 level or above. A minimum grade of B must be received in all of these courses. Certain courses about Asia offered in other departments at the 1000 level may, at the discretion of the advisor and the DUS, be counted toward our major as if they were 2000 level courses, e.g., ASIAN/HIST 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 of each course description. The key is as follows: GE = General Education, LL = Literature and Linguistics, RL = Religion and SC = Society and Culture.

Honsors

To be eligible for honors in Asian Studies, a student must have a cumulative GPA of 3.0, and an average of 3.7 in all Asian Studies area courses, exclusive of language study only, and must successfully complete an honors essay during the senior year. Students who wish to be considered 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 faculty. During the first semester 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 semester the student must present a detailed outline of the honors essay or other appropriate written work 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 writing 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 minor in East Asian Studies by completing at least 18 credits of coursework in East Asian studies.

Students normally take five courses in East Asian Studies at the 2000 level or above from those East Asian courses listed (China, Japan, Korea) either under Asian Studies or Asian-related courses. Of these, two courses might be Asian language courses at the 2000 level or beyond. 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 during Cornell Abroad in East Asia may also be counted toward the minor. 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 minor in South Asia Studies by completing at least 18 credits of coursework work in East Asian studies.

Students may count toward the minor up to two courses in an Asian language at the 2000 level or above. Appropriate South Asia graduate course work may be included in the minor with consent of the advisor and the director of undergraduate studies. Students minoring in South Asia Studies are considered members of the South Asia Program and will have an advisor from the program faculty. If you have questions, contact the Department of Asian Studies, 350 Rockefeller Hall, 552-5095, or lrc.cornell.edu/asian.

Minor in Southeast Asia Studies

A candidate for the bachelor of arts or science degree at Cornell may minor in Southeast Asian Studies by completing 18 credits of coursework in Southeast Asia. A recommended plan would include ASIAN 2208 and four courses at the intermediate or advanced stage, two of which could be a Southeast Asian language. Students minoring in Southeast Asian Studies must select an advisor from the 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 one 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 enrollment in simultaneous 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 join 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.

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 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)]
For description, see HIST 1900. (GE)

[ASIAN 1191 Introduction to Modern Asian History (also HIST 1910) @
(HA-AS)]
Fall. 4 credits. T. Loos and S. Cochran.
For description, see HIST 1910. (GE)

[ASIAN 1192 Introduction to World Music II: Asia (also MUSIC 1302) @ (CA-AS)]
For description, see MUSIC 1302. (GE)

[ASIAN 2208 Introduction to Southeast Asia @ (CA-AS)]
Fall. 3 credits. L. Paterson.
For anyone curious about the most diverse part of Asia; defines Southeast Asia both as the nation-states that have emerged since 1945 (Brunes, 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. B. Rusk.
Introduction to the history and cultural role of writing systems, with a focus on the east of Asia. Topics include myths and debates about writings origin, its religious and magical uses, its spread across linguistic, social and national boundaries, reform movements, calligraphy, and the esthetics of script. Covers the written word from its invention to its incorporation in contemporary art. No language background is required; all readings are in English. (GE)

[ASIAN 2211 Introduction to Japan: Japanese Texts in History @ #
(HA-AS)]
Fall. 3 credits. J. M. Law.
This course surveys major disciplinary approaches to the cultural and historical sciences and humanities of 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. B. Rusk.
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)]
Spring. 3 credits. A. Blackburn.
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 do, and have, expressed 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 @
(Korean)]
Fall. 3 credits. M. Shin.
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)]
Fall. 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 Japan's Literary Heritage: An Introduction in Translation
(LA-AS)]
Spring. 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. 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. Lectures and guided discussions explore the interrelation between the Chinese literary tradition and its history and culture. The goal is to help students toward informed and enjoyable reading of Chinese literature while gaining a deeper understanding of traditional China and its cultural heritage. (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 3373 20th-Century Chinese Literature @ (LA-AS)]
Fall. 4 credits. Next offered 2009–2010. E. Gunn. (LL)
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)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASIAN 3379</td>
<td>Southeast Asian Literature in Translation (LA-AS)</td>
<td>4</td>
<td>L. Paterson</td>
</tr>
<tr>
<td></td>
<td>Spring. An introduction to modern Southeast Asian literature in translation, concentrating on short stories and novels from the modern period. The course will explore the literature thematically with reference to such issues as modernization, decolonization, changing gender roles and relationships, and the urban-rural dichotomy. (LL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 3380</td>
<td>Vietnamese Literature in Translation (also ASIAN 6680)</td>
<td>4</td>
<td>L. Paterson</td>
</tr>
<tr>
<td></td>
<td>Fall. This course is an introduction to Vietnamese literature in translation, concentrating on short stories and novels from the modern period. After reading some more traditional Vietnamese texts, we will examine some of the literary legacies of the Vietnam Wars, as well as themes such as the role of nationalism, changing gender roles and relationships, representations of the urban-rural divide and the effects of censorship. There is no knowledge of Vietnamese literature or the Vietnamese language assumed. (LL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 3387</td>
<td>Literature and Film of South Asia (also COML 3860, VISST 3870)</td>
<td>4</td>
<td>A. Banerjee</td>
</tr>
<tr>
<td></td>
<td>Spring. For description, see COML 3860. (LL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 4411</td>
<td>History of the Japanese Language (also LING 4411, JAPAN 4410)</td>
<td>4</td>
<td>J. Whitman</td>
</tr>
<tr>
<td></td>
<td>Fall. This course examines the ways in which South and Southeast Asian Buddhist communities were formed through the import-export of monks, texts, and relics, as part of a trade in “orthodoxy,” symbolic capital, and magical power. (LL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 4412</td>
<td>Linguistic Structure of Japanese (also LING 4412) (KCM-AS)</td>
<td>4</td>
<td>J. Whitman</td>
</tr>
<tr>
<td></td>
<td>Spring. For description, see LING 4412.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 4424</td>
<td>Scars and Bars: Asian Trauma Memoirs (also ASIAN 6627)</td>
<td>4</td>
<td>L. Paterson</td>
</tr>
<tr>
<td></td>
<td>Spring. For description, see ASIAN 6627.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 4430</td>
<td>Structure of Korean (also LING/KOREA 4430) (KCM-AS)</td>
<td>4</td>
<td>J. Whitman</td>
</tr>
<tr>
<td></td>
<td>Spring. For description, see LING 4430.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 4437</td>
<td>Research Methods in Pre-Modern China (also ASIAN 6611)</td>
<td>4</td>
<td>B. Rusk</td>
</tr>
<tr>
<td></td>
<td>Fall. For description, see ASIAN 6611.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 4481</td>
<td>Translation and Cultural Difference (also COML 4700) (KCM-AS)</td>
<td>4</td>
<td>N. Sakai</td>
</tr>
<tr>
<td></td>
<td>Fall. For description, see COML 4700.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 5505</td>
<td>Methodology of Asian Language Learning and Teaching</td>
<td>2</td>
<td>S. Sukle</td>
</tr>
<tr>
<td></td>
<td>Spring. 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)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 2201</td>
<td>Buddhist Felicities (CA-AS)</td>
<td>4</td>
<td>A. Blackburn</td>
</tr>
<tr>
<td></td>
<td>Spring. For description, see ASIAN 2201.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 2226</td>
<td>Society and Religion in China (also HIST 2261)</td>
<td>3</td>
<td>T. J. Hinricks</td>
</tr>
<tr>
<td></td>
<td>Spring. For description, see HIST 2261.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 2277</td>
<td>Meditation in Indian Culture (also RELST 2277)</td>
<td>3</td>
<td>D. Gold</td>
</tr>
<tr>
<td></td>
<td>Spring. 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)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 3306</td>
<td>Zen Buddhism (KCM-AS)</td>
<td>4</td>
<td>L. McCrea</td>
</tr>
<tr>
<td></td>
<td>Spring. This course will survey the rich and sophisticated tradition of Indian philosophical thought from its beginnings in the speculative phases of Upanishads, when debate between Hindus, Buddhists, Jains and materialist philosophers about the existence and nature of God and of the human soul, the nature of knowledge, and the theory of language. (RL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASIAN 3344</td>
<td>Introduction to Indian Philosophy (KCM-AS)</td>
<td>4</td>
<td>D. Gold</td>
</tr>
<tr>
<td>ASIAN 3347</td>
<td>Tantric Traditions (also RELST 3349)</td>
<td>4</td>
<td>D. Gold</td>
</tr>
<tr>
<td>ASIAN 3348</td>
<td>Indian Devotional Poetry (also RELST 3347)</td>
<td>4</td>
<td>D. Gold</td>
</tr>
<tr>
<td>ASIAN 3351</td>
<td>Indian Religious Worlds (also RELST 3351)</td>
<td>4</td>
<td>D. Gold</td>
</tr>
<tr>
<td>ASIAN 3354</td>
<td>Indian Buddhism (also ASIAN 6654, RELST 3354/6654)</td>
<td>4</td>
<td>D. Boucher</td>
</tr>
<tr>
<td>ASIAN 3355</td>
<td>Japanese Religions (also RELST 3355)</td>
<td>4</td>
<td>J. M. Law</td>
</tr>
<tr>
<td>ASIAN 4421</td>
<td>Religious Reflections on the Human Body (also RELST 4421)</td>
<td>4</td>
<td>J. M. Law</td>
</tr>
<tr>
<td>ASIAN 4438</td>
<td>Monks, Texts, and Relics: Transnational Buddhism in Asia (also ASIAN 6636, RELST 4438/6638)</td>
<td>4</td>
<td>J. M. Law</td>
</tr>
<tr>
<td>ASIAN 4441</td>
<td>Mahayana Buddhism (also RELST 4441)</td>
<td>4</td>
<td>J. M. Law</td>
</tr>
<tr>
<td>ASIAN 4444</td>
<td>Ritual Puppetry and Japan I (also RELST 4444)</td>
<td>4</td>
<td>J. M. Law</td>
</tr>
<tr>
<td>ASIAN 4449</td>
<td>History and Methods of the Academic Study of Religion (also RELST 4449)</td>
<td>4</td>
<td>J. M. Law</td>
</tr>
<tr>
<td>ASIAN 4460</td>
<td>Indian Meditation Texts (also RELST 4460)</td>
<td>4</td>
<td>J. M. Law</td>
</tr>
<tr>
<td>ASIAN 4489</td>
<td>Religion and Sustainability: Traditional Discourses in the 21st Century (also RELST 4489)</td>
<td>4</td>
<td>J. M. Law</td>
</tr>
</tbody>
</table>
A S I A N  S T U D I E S  4 7 1

[ASIAN 4513 Religion and Politics in Southeast Asia (also ANTHR 4413) @ (CA-AS)]
Spring. 4 credits. Next offered 2008–2009. A. Willford. For description, see ANTHR 4513. (RL)

Asia—Society and Culture Courses

[ASIAN 2206 The Occult Tourist: Travel Writing and Orientalism in Southeast Asia (also ASIAN 5507, HIST 2070/5070) @ (CA-AS)]
Fall. 4 credits. Next offered 2009–2010. T. Loos. (SC)

ASIAN 2210 Pop Culture in China (also HIST 2210) @ (HA-AS)
Spring. 4 credits. T. J. Hinrichs. For description, see HIST 2210. (SC)

[ASIAN 2219 Women and Gender in South Asia (also FGSS/HIST 2190) @ (HA-AS)]

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 analyses written 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)]

ASIAN 2245 Gamelan in Indonesian History and Cultures (also MUSIC 1341, HIST 2744) @ (LA-AS)
Fall or spring. 3 credits. Prerequisite: permission of instructor. M. Hatch and staff. For description, see MUSIC 1341. (SC)

[ASIAN 2257 China Encounters the World (also CAPS 2570, HIST 2571) @ (HA-AS)]
Fall. 3 credits. Next offered 2009–2010. J. Chen. (SC)

[ASIAN 2275 History of Modern South Asia (also HIST 2750) @ # (HA-AS)]

ASIAN 2290 East Asian Martial Arts (also HIST 2960) @ (HA-AS)
Fall. 4 credits. 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 2009–2010. S. Cochran. (SC)

ASIAN 2296 From Slow Boats to CEOs?: The Chinese of Southeast Asia @ (CA-AS)
Spring. 4 credits. L. Paterson. From a Thai king’s pamphlet on the “Jews of the East,” to the 1998 anti-Chinese riots in Indonesia, the ethnic Chinese of Southeast Asia have long been positioned as a privileged and wealthy elite who wield disproportionate power and influence. But what lies behind these stereotypes? Beginning with the history of Chinese migration to Southeast Asia, this interdisciplinary course will examine the changing relationship between China and its Southeast Asian sojourners, as well as Chinese cultural and social impact in the region. Through a series of case studies, the course will interrogate issues of how Chinese ethnicity is constructed within this transnational Chinese Diaspora, and how it impacts contemporary issues in Southeast Asia. (SC)

ASIAN 2298 The U.S.–Vietnam War (also HIST 2890) @ (HA-AS)
Fall. 4 credits. F. Logevall. This course will examine events relating to the struggle for Vietnam, 195–1975, with particular attention to the period of heavy U.S. involvement. Readings will include historical narratives, memoirs, and literature. Occasional films will be screened. (SC)

ASIAN 3301 Schools of Thought—Ancient China @ (HA-AS)
Spring. 4 credits. 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. In addition to primary sources, students will read a number of secondary articles on intellectual and textual history of the classical period. Our main objectives are: an overview of the traditional understanding of the major schools and thinkers, based on careful reading and in-class discussions of the texts; and, beyond this, calling the very concept of “schools of thought in ancient China” into question, looking at recent critical scholarship on the period and examining archaeologically discovered materials that bear on this issue. (SC)

[ASIAN 3302 Art of War in Ancient China @ (HA-AS)]
Fall. 4 credits. Next offered 2009–2010. 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 3312 Intellectuals in Early Modern Korea @ (HA-AS)]
Spring. 4 credits. Prerequisite: one course on modern Japan or Korea. Next offered 2009–2010. M. Shin. (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 3328) @ # (HA-AS)]

[ASIAN 3335 Japan from War to Prosperity (also HIST 3300) @ (HA-AS)]
Fall. 3 credits. Next offered 2009–2010. V. Koschmann. (SC)

[ASIAN 3361 Bakumatsu-ISSHIN: Conflicts and Transformation in Early Modern Japan, 1700–1890 (also HIST 3611) @ (HA-AS)]
Fall. 4 credits. Next offered 2009–2010. K. Hirano. For description, see HIST 3611. (SC)

ASIAN 3381 Introduction to the Arts of Japan (also ARTH 3820) @ (LA-AS)
Fall. 4 credits. A. Pan. For description, see ARTH 3820. (SC)

ASIAN 3382 Art of South Asia, 1500–Present @ (also ARTH 3611) (KCAL)
Spring. 4 credits. I. Dadi. For description, see ARTH 3611. (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 2009–2010. K. Taylor. Survey of Vietnamese history and culture from earliest times to the present. (SC)

[ASIAN 3386 Southeast Asia through Film @ (CA-AS)]

[ASIAN 3388 Theorizing Gender and Race in Asian Histories and Literatures (also ASIAN 6688, COML 3980/6880, FGSS 3580) @ (CA-AS)]
Spring. 4 credits. Next offered 2009–2010. N. Sakai. (SC)

[ASIAN 3391 Martial Arts and Society and Religion (also HIST 3191) @ (HA-AS)]
Fall. 4 credits. Next offered 2009–2010. T. J. Hinrichs. (SC)

ASIAN 3394 The House and the World: Architecture of Asia (also ARTH 3655/VISS HIST 3655) @ (HA-AS)
Spring. 4 credits. K. McGowan. For description, see ARTH 3655. (SC)

ASIAN 3396 Southeast Asian History from the 18th Century (also HIST 3960/6960) @ (HA-AS)
Spring. 4 credits. T. Loos and 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 2009–2010. E. Tagliacozzo. For description, see HIST 3950. (SC)
ASIAN 4408 The Korean War
Spring. 4 credits. Staff.
The Korean War was both the defining event of modern Korean history and a formative moment in the development of the Cold War. This course will examine the internal origins of the war, the U.S. and Soviet occupations of southern and northern Korea from 1945–1948, the development of Cold War policies, and the conduct of the war itself. We will also cover cinematic and literary depictions of the war in South Korea. The objective is to give students a better understanding of the war as both a civil and an international conflict whose outcome solidified a division that has outlasted the Cold War and persists to this day. (SC)

[ASIAN 4409 Archipelago: The Worlds of Indonesia (also ASIAN 6617, HIST 4100/6100) @ (HA-AS)]
E. Tagliacozzo. (SC)

[ASIAN 4410 Chinese Film @ (LA-AS)]
E. Gunn. (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 2009–2010.
T. Loos. (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. V. Koschmann.
For description, see HIST 4070. (SC)

ASIAN 4428 Formation of the Field (also HIST 4428) @ (HA-AS)
Fall. 4 credits. N. Sakai.
This course will provide both historical introduction to and critical analysis of the constitution of Japanese Studies as a “field” of postwar academic inquiry. While reading texts particularly influential in the early and contemporary formation of the field, we will consider such questions as the domestic and international contexts in which Japanese Studies has been institutionalized and maintained, and the relationship between “Japan” as an object of area studies discourse and “Japan” as represented in American journalism, popular culture, and politics. The course will examine historical origins of area studies and various critiques conducted about area studies as a model of academic discipline. Possibilities for cross-disciplinary research (along lines recently undertaken in fields such as feminist criticism and cultural studies) will also be explored. (SC)

ASIAN 4436 Topics in Indian Film @ (LA-AS)
Spring. 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 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. (SC)

ASIAN 4485 Western Literature and Film (also COML 4145/6145) @ (LA-AS)
Spring. 4 credits. T. J. Hinrichs.
For description, see COML 4145. (SC)

[ASIAN 4492 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. S. Cochran.
For description, see HIST 4930. (SC)

[ASIAN 4494 India: Nation and Narration, History and Literature (also HIST 4921) @ (CA-AS)]
D. Ghosh and A. Banerjee.
For description, see HIST 4921. (SC)

[ASIAN 4499 Problems in Modern Chinese History (also HIST 4990/6940) @ (HA-AS)]
Spring. 4 credits. Prerequisite: permission of instructor. Next offered 2009–2010.
T. J. Hinrichs. (SC)

[ASIAN 5507 The Occidental Tourist (also ASIAN 2206, HIST 2070/5070)]
Fall. 4 credits. Next offered 2009–2010.
T. Loos. (SC)

ASIAN 5581 Dancing the Stone: Body, Memory and Architecture (also ARTH 5580, THETR 5800, VISST 4280)
Spring. 4 credits. K. McGowan.
For description, see ARTH 5580. (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
Fall. 1 credit. Recommended: reading knowledge of at least one SE Asian language or other Asian language and a major European language. Next offered 2009–2010. G. Green. (LL)

ASIAN 6615 Histories of Tokugawa Japan (also HIST 6150)
For description, see HIST 6150. (SC)

ASIAN 6617 Archipelago: The Worlds of Indonesia (also, ASIAN 4409, HIST 4100/6100)

[ASIAN 6618 Gender and Sexuality in Southeast Asian History (also ASIAN 4416, HIST 4160/6160)]
Fall. 4 credits. Prerequisite: graduate standing. Next offered 2009–2010. T. Loos.
For description, see HIST 4160. (SC)

ASIAN 6619 Graduate Seminar: Translation in Theory (also COML 6160, VISST 6619)
Because it entails a necessary exposure to a drudgery—the excess of signification in language—translation has become, for some philosophers, an exemplary ethical practice. The course will take up texts by Benjamin, Derrida, Deleuze, Sherry Simon, Tawada Yoko, and others. (LL)

[ASIAN 6626 The 18th Century and the Emergence of Literary Modernity (also COML 6380)]

[ASIAN 6627 Scars and Bars: Asian Trauma Memoirs (also ASIAN 4424)]

ASIAN 6629 Contemporary Studies of Japan
Fall. 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 6634 Buddhist Studies Seminar Spring. 4 credits. Prepares graduate students studying Asian religions for an examination; other graduate students may enroll with permission of instructor. Next offered 2009–2010. A. Blackburn. (RL)]

[ASIAN 6638 Monks, Texts, and Relics: Transnational Buddhism in Asia (also ASIAN 4438, RELST 4438/6638)] Spring. 4 credits. Prerequisites: one 3000-level or above course in ASIAN or RELST or permission of instructor. 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. Recommended: reading knowledge of modern Japanese. Next offered 2009–2010. Staff.

[ASIAN 6653 Buddhist Narrative Literature (also RELST 6653)] Fall. 4 credits. Prerequisite: two years of Sanskrit OR one year of literary Chinese. D. Boucher. This seminar will focus on close readings of Buddhist narrative literature, particularly jataka and avadana tales preserved in Sanskrit and Chinese. The plan for the seminar is as follows: students who read Sanskrit will meet during the first hour, students who read Chinese will meet during the third hour. Both groups of students will meet during the second hour to discuss issues related to genre, including notions of gifting, discourses on gender, and representations of the body in this literature. (RL)

[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 2009–2010. D. Boucher. (RL)

[ASIAN 6659 Seminar in Vedic Philology (also CLASS 7690, LING 6659) (KCM-An)] Fall. 4 credits. Next offered 2009–2010. 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 ANTH, ASIAN, HIST, RELST at 3000 level or above or permission of instructor. A. Blackburn.

[ASIAN 6668 Arendt, Morisaki, Weil (also ASIAN 4468, COML 4386/6240)] Fall. 4 credits. Next offered 2009–2010. B. deBary. (SC)

This course is limited to graduate students with a strong interest in the academic study of religion. (RL)

[ASIAN 6671 Paleoanthropology of South Asia (also ANTHR 6371, BIOEE 6710)] Fall. 3 credits. Limited to 15 students. Next offered 2009–2010. K. A. R. Kennedy.

[ASIAN 6676 Southeast Asia Reading Seminar: The Early Thai Novels Fall. 4 credits. Next offered 2009–2010. T. Chalooentirana. (LL)]

[ASIAN 6680 Vietnamese Literature in Translation (also ASIAN 3380)] Fall. 4 credits. L. Paterson.


[ASIAN 6688 Theorizing Gender and Race in Asian Histories and Literatures (also ASIAN 3386, 3500/6500, HIST 3860/6860)] Spring. 4 credits. Prerequisite: reading knowledge of Japanese. Next offered 2009–2010. N. Sakai. (SC)]

[ASIAN 6692 Medicine and Healing in China (also ASIAN 4469, BSOC/HIST/STS 4961, HIST 6961) Spring. 4 credits. T. J. Hinrichs.

[ASIAN 6693 Problems in Modern Chinese History (also ASIAN 4493, HIST 4930/6930)] Fall. 4 credits. S. Cochran.

[ASIAN 6694 Problems in Modern Chinese History (also ASIAN 4499, HIST 4990/6990)] Spring. 4 credits. Next offered 2009–2010. S. Cochran. (SC)

[ASIAN 6696 Modern Southeast Asia: Graduate Proseminar (also HIST 3960/6960)] Spring. 4 credits. T. Loos.

[ASIAN 6697 Premodern Southeast Asia (also ASIAN 3397, HIST 3950/6950)] Fall. 4 credits. Next offered 2009–2010. E. Tagliacozzo.

[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. V. Koschmann. (SC)


[ASIAN 7708 Academic Study of Religion] Fall. 4 credits. Prerequisite: graduate standing and permission of instructor


BENG 1121–1122 Elementary Bengali 1121, fall; 1122, spring. 4 credits each semester. Prerequisite: for BENG 1121, BENG 1121 or examination. Letter grades only. S. Mukherjee.

Enables students to read and comprehend basic Bengali texts as well as speak and write in the language. The introduction of the Bengali script is complemented by detailed instruction in grammar. An interactive videoconference course.

BENG 2201–2202 Intermediate Reading and Conversation @ 2201, fall; 2202, Spring. 4 credits each semester. BENG 2201 satisfies Option 1. Prerequisites: for BENG 2201, BENG 1122 or examination; for BENG 2202, BENG 2201 or examination. Letter grades only. S. Mukherjee.

Building on skills mastered at the elementary level and continuing grammar instruction, this course is designed to advance students’ oral competence and enhance comprehension skills through reading and listening. Its aim is to enable students to interact productively when immersed in the environment and/or to carry out research in primary material in the language.

BENG 2203–2204 Intermediate Bengali Composition and Conversation 2203, fall; 2204, spring. 2 credits each semester. Prerequisites: for BENG 2203, BENG 2202 or examination; for BENG 2204, BENG 2203 or examination. Letter grades only. S. Mukherjee.

Complements the verbal skills developed in BENG 2201–2202 by improving writing skills.
BURM 3303–3304  Bengali Literature 
I, II @
3303; fall; 3304, spring. 4 credits each semester. Prerequisites: BENG 2205–2204 or equivalent. BENG 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.

BURM 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.

Chinese
Note: Testing for placement, including those with near-native abilities (particularly those schooled in a Chinese setting up until the age of about 12), takes place in registration week, before classes begin. Time and place will be posted at lrc.cornell.edu/AsianPrograms/placement and on the bulletin board outside 350 Rockefeller Hall. Students with some Chinese schooling who want to obtain credits for their proficiency will be tested at the beginning of the second week of classes. Again, the time and place will be announced.

CHIN 1101–1102  Beginning Mandarin I and II
1101, fall; 1102, spring. 6 credits each semester. Limited to 10–12 students per sec. Prerequisite: CHIN 1101 or permission of instructor. Students must enroll in lec and one sec. Because of limited sec size, students missing first two 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) and 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 215.

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: 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/AsianCourses/ch/chin111.

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) and 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 215.

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 1110 with grade of C+ or above or equivalent; 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, CHIN 1110 or equivalent; 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 CHIN 2211, permission of instructor or completion of CHIN 1112 or elementary conversational skills in Cantonese from heritage but very limited formal training in Cantonese character reading and writing; for CHIN 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 aloud and writing Cantonese characters as well as simple composition writing skills in Cantonese characters. For more details, see lrc.cornell.edu/AsianCourses/ch/chin211.

CHIN 2213–2214  High Intermediate Cantonese I and II @
2213, fall; 2214, spring. 4 credits each semester. CHIN 2213 satisfies Option 1. Prerequisite: for CHIN 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 CHIN 2214: CHIN 2213 or equivalent. Letter grades only. H. Huang.

Chinese Heritage I and II @
Works on standard Chinese pronunciation and differences in vocabulary and grammar between Cantonese and Mandarin.

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, CHIN 2202 or equivalent; 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) @]**

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 (also CHIN 5509/5510) @]**
Fall, spring. 4 credits each semester. **CHIN 309 satisfies Option 1.** Prerequisite: permission of instructor only. Letter grades only. Next offered 2009–2010. Z. Chen.

A two-semester sequence for those who have studied Mandarin to the advanced level (or equivalent). Aims to enhance students’ language skills in the business context and to promote understanding of the macro and micro business environment and culture in China.

**CHIN 3341 High Intermediate Mandarin: CAPS in D.C. @**
Fall. 4 credits. Letter grades only. Staff. For description, see CHIN 3301.

**CHIN 4411 Advanced Mandarin: CAPS in D.C. @**
Fall. 4 credits. Letter grades only. Staff. For description, see CHIN 4411.

**CHIN 4444 Directed Study: CAPS in D.C. @**
Fall. 1–4 credits. Letter grades only. Staff. For description, see CHIN 4411.

**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 4411.

**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 (also CHIN 3309–3310) @**
Fall, spring. 4 credits each semester. Next offered 2009–2010. 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 2009–2010. Staff.

**[CHIN 6626 Historical Documents on Modern China (also CHIN 4426, HIST 4650/4650) @]**
Fall. 4 credits. Prerequisite: permission of instructor. Next offered 2009–2010. Z. Chen.

For description, see CHIN 4426.

**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

Students must apply formally to FALCON program; open to all Cornell students and students from other institutions. S. Divo and staff.

This course involves work on all four skills: speaking, listening comprehension, reading and writing. Students who complete this course with a grade of C 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: for CHIN 2260, CHIN 1150 or equivalent 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 9:30 a.m. to 4:30 p.m., with 1–2 hours per day of self-directed practice in Cornell’s Language Resource Center.

**CHIN 3360 Advanced Intensive Mandarin (FALCON) @**
Spring. 16 credits. CHIN 3360 is scheduled to be held in Beijing. People’s Republic of China. S. Divo and staff.

After finishing the spring and fall terms at Cornell, students have the language skills to take 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 summer semester, all the 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 a 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 am to 4:30 pm, 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: for CHIN 2260, CHIN 1150 or equivalent 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 9:30 a.m. to 4:30 p.m., with 1–2 hours per day of self-directed practice in Cornell’s Language Resource Center.
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 I. 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 a 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 214 or permission of instructor. D. X. Warner and B. Rusk. This course surveys selected texts—primarily in prose—from the ancient and medieval periods. Through close reading, students expand their knowledge of the diction, syntax, and various genres, themes, and literary styles that were foundational for the later Chinese literary tradition. (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)  
Fall. 4 credits. Prerequisite: minimum three years of Chinese and/or one year of Classical Chinese or permission of instructor. Next offered 2009–2010. 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 2009–2010. D. Boucher. (LL)

CHLIT 6603 Seminar in Chinese Fiction and Drama  
Fall. 4 credits. Prerequisite: permission of instructor. Next offered 2009–2010. E. Gunn. (LL)

CHLIT 6605 Seminar in Chinese Fiction and Drama  
Fall. 4 credits. Prerequisite: permission of instructor. Next offered 2009–2010. B. Rusk. (LL)

CHLIT 6610 Chinese Cultural Criticism  
Spring. 4 credits. Next offered 2009–2010. E. Gunn. (SCI)

CHLIT 6615 Seminar: Ideas and Literature of Medieval China  

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 2009–2010. 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  
1101, fall; 1102, spring. 6 credits each semester. Students may not receive credit for both HINDI 1101 and 1102. Students may not receive credit for both HINDI 1102 and 1101. Prerequisite: for HINDI 1102, HINDI 1101 or equivalent. Letter grades only. S. Singh and staff. This is a course designed for complete beginners 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  
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 1110 and 1111. 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 @  
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 @  
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 and listening 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 1112 or placement by instructor. INDO 2205 is 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.

JAPAN 1101–1102 Elementary Japanese
1101, fall; 1102, spring. 6 credits each semester. Prerequisite for 1102: JAPAN 1101 or placement by instructor during registration. Intended for beginners or those who have been placed in the course by examination. Students must enroll in onelec and one sec. Letter grades only. M. Suzuki and staff.
Provides 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 Conversation I @
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 onelec 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. Sections are conducted entirely in Japanese to give opportunities to practice socio-cultural 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 aids and explain cultural background and customs useful for effective oral and written communication.

JAPAN 3305–3306 Continuing Intermediate Japanese
3305, fall; 3306, spring. 4 credits each semester. S. Ichikawa.
Continuing instruction at the high intermediate level for those with two-three years of learning experience. Further develops oral communication skills as well as reading and writing ability.

JAPAN 4401–4402 Advanced Japanese
4401, fall; 4402, spring. 4 credits each semester. Prerequisites: for JAPAN 4401, JAPAN 3302 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) @
# (IAA-AS)
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, correctness, 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 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 the 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 is up to three hours a day 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 220 at Cornell or placement by FALCON staff. R. Sukie 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 the Fundamental Vocabulary and Grammar of Classical Japanese @ #**

Fall, 4 credits. Prerequisite: JAPAN 4402 or permission of instructor. 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. 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**

Spring, 4 credits. 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**


**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, 1–4 credits. Prerequisite: permission of instructor. Staff.

---

**Khmer (Cambodian)**

**KHER 1121-1122 Elementary Khmer**

1121, fall; 1122, spring, 4 credits each semester. Prerequisite: for KHER 1122, KHER 1121; for beginners or those placed in course by examination. Letter grades only. H. Phan. Gives a thorough grounding in speaking and reading.

**KHER 2201-2202 Intermediate Khmer Reading @**

2201, fall, 2202, spring, 3 credits each semester. KHER 2201 satisfies Option 1. Prerequisites: for KHER 2202, KHER 1121; for KHER 2202, 2201. Letter grades only. H. Phan. Continuing instruction in spoken and written Khmer.

**KHER 2203-2204 Intermediate Composition and Conversation @**

2203, fall, 2204, spring, 3 credits each semester. KHER 2203 satisfies Option 1. Prerequisites: for KHER 2203, KHER 1121; for KHER 2204, 2203. Letter grades only. H. Phan.

**KHER 3301-3302 Advanced Khmer @ #**

3301, 3302, fall; 4 credits each semester. KHER 3301 satisfies Option 1. Prerequisites: for KHER 3301, KHER 2202 or equivalent; for KHER 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.

**KHER 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**

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 1102 or for KOREA 1102 and KOREA 1110. Letter grades only. M. Song. Covers basics of speaking, reading, and writing. Introduces Hangul writing system and grammar.

**KOREA 1109-1110 Elementary Korean Reading and Writing**

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 @**

2201, fall; 2202, spring, 4 credits each semester. KOREA 2201 satisfies Option 1. Prerequisites: for KOREA 2201, KOREA 1110 or permission of instructor; for KOREA 2202, 2201. Letter grades only. J. Choi. 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 @**

2209, fall; 2210, spring, 4 credits each semester. KOREA 2209 satisfies Option 1. Prerequisites: for KOREA 2209, KOREA 1110 or permission of instructor; for KOREA 2210, 2209 or permission of instructor. If in doubt about eligibility, see instructor. Letter grades only. J. Choi. Intermediate level of reading comprehension and writing course for students who have acquired basic oral proficiency. Introduces some reading and writing with Chinese characters.

**KOREA 3301–3302 High Intermediate Korean @**

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, placement by instructor. Letter grades only. J. Choi. 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: Fluency in Korean and permission of instructor. Letter grades only. Taught in Korean. Staff. In-depth examination of topics on Korea.

**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. Staff.

---

**Korean Literature @ (LA-AS)**

**KRIT 4405 Readings in Korean Literature @ (LA-AS)**

Spring, 4 credits. Next offered 2009–2010. J. Whitman. For description, see LING 4450.]
selected to provide a mixture of canonical and contemporary authors. Students will also have to read some academic works of literary history and literary criticism. (LL)

[KRLIT 4432 Middle Korean (also LING 4432) @ (LA-AS)]
Spring. 4 credits. Prerequisite: KOREA 3501 or equivalent. Next offered 2009–2010. J. Whitman.
For description, see LING 4432. (LL)

[KRLIT 6615 Development of Literary Modernity in Korea]
Fall. 4 credits. Prerequisite: fluency in Korean. Graduate students only. M. Shin.
This course examines the formation of literary modernity in Korea through a survey of some of the major writers of the early 20th century. Students will take an inter-textual approach to their novels by reading them in the context of their critical works on literary modernism. (LL)

[KRLIT 6617 Colonial Modernity in Korea]
This course examines the nature of colonial modernity in Korea, its effects on the economy, society, and resistance movements, and intellectual responses to it. (SC)

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).

Nepali 1101–1102 Elementary Nepali
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.

Nepali 2201–2202 Intermediate Nepali Conversation @
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.

Nepali 2203–2204 Intermediate Nepali Composition @
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.

Nepali 3301–3302 Advanced Nepali @
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.

Pali

Pali 1131–1132 Elementary Pali
1131, fall; 1132, spring. 3 credits each semester. This language series may not be used to satisfy language requirement. A. Blackburn.

Pali 1151–1152 Accelerated Elementary Pali
1151, fall; 1152, spring. 3 credits each semester. Prerequisites: prior background in Sanskrit or permission of instructor. A. Blackburn.
An accelerated one-semester introduction to Pali that assumes prior study of Sanskrit (normally at least one year). Readings include textbook sections and original texts, beginning with simple prose.

Pali 4450 Readings in Pali @
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

Sanskrit 1131–1132 Elementary Sanskrit (also CLASS 1331–1332, LING 1131–1132)
1131, fall; 1132, spring. 4 credits each semester. Letter grades only. A. Nussbaum.
An introduction to the essentials of Sanskrit grammar. Designed to enable the student to read classical and epic Sanskrit as quickly as possible.

Sanskrit 2251–2252 Intermediate Sanskrit (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 Hybrid Sanskrit]

[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

SINLT 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.

[SINLT 4465 The Literature of Ancient India]
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)

Sinhala 1121–1122 Elementary Sinhala
1121, fall; 1122, spring. 4 credits each semester. Prerequisite: for SINHA 1121, SINHA 1122 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.

Sinhala 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.

Sinhala 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  
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  
2205, fall; 2206, spring. 3 credits each semester. Prerequisite: TAG 2205 satisfies Option 1. Letter grades only. T. Savella.  
Develops all four skills: reading, writing, speaking, and comprehension.

TAG 3301–3302  Advanced Tagalog  
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  
1121, fall; 1122, spring. 4 credits. 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 and perform one of their daily activities. All course activities conducted in Tamil. An interactive videoconference course.

TAMIL 2201–2202  Intermediate Tamil  
2201, fall; 2202, spring. 4 credits.  
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, discussed only. B. Herath. Tamil 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  
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  
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  
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  
2203, fall; 2204, spring. 3 credits each semester. VIET 2203 satisfies Option 1. Prerequisite: permission of 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  
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 3502, 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 styless 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  
Fall. 3 credits. Satisfies Option 1.  
Prerequisite: qualification in Vietnamese or permission of instructor. Next offered 2009–2010. R. 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
- ECON 4730 Economics of Export-Led Development (SC)
- ILRRC 6370 Labor Relations in Asia (SC)

**China—Area Courses**

- [ANTHR 356 The Situation of China's Minorities (SC)]
- ANTH 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)]

**Japan—Area Courses**

- ANTH 2560 Japanese Society through Film (SC)
- ANTH 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**

- ANTH 3421/6421 Sex and Gender (SC)
- ANTH 3545 Peoples and Cultures of the Himalayas (SC)
- ANTH 4406 Culture of Lives (SC)
- [ANTHR 6373 Human Evolution: History, Concepts, and Theory (also BIOES 6373) (SC)]
- ANTH 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 Economic Problems of India (SC)]
- HD 6330 Language Acquisition (SC)

**Southeast Asia—Area Courses**

- [ANTHR 3516 Power, Society, and Culture in Southeast Asia (SC)]
- ANTH 4420 Development of Anthropology Thought (SC)
- ANTH 4523 Making History on the Margins: The China–SE Asian Borderslands (SC)
- ANTH 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 5855 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 graduate student Asian Pacific American Graduate Association. 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 year-long intensive study of selected themes.

**Core Faculty**

D. Chang, C. Lai, V. Munasinghe, T. Tu, 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. C. Lai.

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 2090 The Immigrant Imagination (also AMST 2091, ARTH 2190) (HA-AS)**

Spring, 4 credits. T. Tu.

This course explores how contemporary immigrant experiences are expressed through visual culture. Class examines a variety of expressive forms produced by recent immigrants, and will consider the ways that they function as a type of “migration narrative.” By doing so, we will make connections between visual representations and other modes of narration, including literary and musical. We will ask: How does the visual arts operate within immigrant communities as a...
mode of story-telling or history-making? How have immigrants employed visual culture to narrate their cross-cultural movements, community-building efforts, political struggles, and cultural memories? Is there such a thing as “immigrant art” if so, what are its characteristics and how does it help to reshape our understanding of contemporary artistic productions.


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. S. Wong.
For description, see ANTHR 3703.


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.

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) Spring. 3 credits. Next offered 2009–2010. 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 West Delta. We analyze not only the fatal coupling of difference, power, and space, but also the spatial politics of resistance and refusal.

AAS 4130 Race, Technology, and Visuality (also AMST/ARTH 4113) (CA-AS) Fall. 4 credits. Next offered 2009–2010. T. Tu.
Examines how new information and communication technologies have altered the ways we visualize and perform racial identities. Questions the popular assumption that the “information revolution” has made it possible and even desirable to transcend racial differences by exploring the following: how racial hierarchies have informed debates around technoh-interest, creativity, ownership, and agency.

AAS 4310 Mind, Self, and Emotion (also HD 4310) Spring. 3 credits. Staff.
For description, see HD 4310.

AAS 4420 Asian American Communities (also AMST/HIST 4200) (HA-AS) Fall. 4 credits. D. Chang.

AAS 4520 Culture and Human Development (also COGST/HD 4520) Next offered 2009–2010.
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)
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. Limited to 15 students.

ASTRONOMY

The department offers a number of courses to planetary exploration missions. Atacama desert in Chile. Several members of the faculty have 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 1112–1123–2214 or 1116–1126–2218 and the complementary pathway in mathematics, MATH 1110–1220–2210–2220 or 1910–1920–2920–2940 (or equivalent). Students who anticipate undertaking graduate study in astronomy are urged to elect the introductory physics sequence PHYS 1112–2217–2218–3318–3327 if possible. The sophomore seminar Astrophysics 2253 Topics in Astronomy and Astrophysics provides an introduction to current research in astronomy and astro-physics for prospective majors, but is not required of students who elect to major in Astronomy after the sophomore year. Students are also urged to acquire computer literacy. ASTRO 3354 is designed to give students hands-on experience with the methods of analysis, visualization, and simulation used 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 3310 or 3318, 3316, 3523 or 3527, 3341 or 3342 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 an additional course or to take additional courses in related fields. 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 undergraduate 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. ASTRO 2253 is recommended for sophomores planning to concentrate in Astronomy.

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 and T. Herter.

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. J. Lloyd and T. Herter.

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. J. Lloyd and T. Herter.

Identical to ASTRO 1101 except for addition of the laboratory. Students may not receive credit for both ASTRO 1101 and 1103.

ASTRO 1104 Our Solar System (PBS)
Spring. 4 credits. Limited to 22 students per lab, 30 students per disc sec. J.-L. Margot.

Identical to ASTRO 1102 except for addition of the laboratory. Students may not receive credit for both ASTRO 1102 and 1104.

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. J. Kregenow.

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 pulsars, pulsars, 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 it? 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. J. Kregenow.

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 1109 FWS: Birth of the Universe
Spring. 3 credits. A. Martin.

Our knowledge of the universe has been revolutionized by discoveries in the past century and is very much a work in progress. The history of the origin, evolution, and ultimate fate of the entire universe (collectively known as cosmology) is full of instances where a widely accepted belief was shown to be most likely false. Our current cosmological theories are also riddled with many issues that are not yet fully understood. We will read popular texts by such authors as Carl Sagan and Alan Lightman to learn what we know about some recent burning cosmological questions: What happened after the Big Bang? What exactly are dark matter and dark energy? What does the future hold for our universe? Students will have an opportunity to participate in some of the many currently heated debates in cosmology through writing and in-class discussions.

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 navigation by the stars, construction and use of simple instruments such as optical spectroscopes 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.
ASTRO 2200  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 Katter. 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. Nicholson.

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 space 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/astro2233. M. Haynes and D. Campbell.

The course title changes yearly. The Fall 2008 course will explore the theme: "Science with the Big Dish in the Jungle: The Arecibo Telescope." Constructed in northwestern Puerto Rico in the 1960's, the 305 meter diameter Arecibo antenna remains the world's largest radio/radar telescope. In this class, we will explore how continuing advances in technology have enabled new scientific discoveries with Arecibo especially in the fields of planetary, pulsar and extragalactic science. Topics will include application of asteroid and pulsar observations to test general relativity and extreme physics, determination of orbital parameters for near-Earth asteroids and the search for "stealth galaxies" composed almost entirely of dark matter. Organized as a seminar, with readings and discussions. Students may have the opportunity to participate in observations using Arecibo conducted remotely from the Space Sciences Building.

[ASTRO 2280  Space Exploration (PBS)]
Fall. 3 credits. No special background in physical sciences, math, or engineering assumed. Next offered 2009-2010. S. Squyres.

Provides an overview of space science, with particular emphasis on the solar system, and a detailed examination of 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 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. Prerequisite: freshman physics, calculus, and geometry. Next offered 2009-2010. I. Wasserman.

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. Next offered 2009-2010. Y. Tizzano.

Reviews 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 SS610). Next offered 2009-2010. 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 2215 or 2217. J. Houck.

Introduction to astrophysics, 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. Houck.

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 data 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 3510 or 3560), PHYS 3523/3327 (or co-registration) and permission of instructor required (form available in SS610). J. Bell, J. Cordes, and J. Houck.

Observational astrophysics. Major experiments involve techniques in CCD (charge-coupled-device) imaging, optical photometry, optical spectroscopy, radiometry, radio astronomy 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. Lai 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 (P/BS)**
Spring. 4 credits. Prerequisite: ASTRO 4431 or permission of instructor. R. Bean 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, Friedman equations, dark matter, cosmological tests, the early universe, and the cosmological production of the elements.

**ASTRO 4444 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. 3 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, E. Flanagan.

For description, see PHYS 6553.

**ASTRO 6510 Applications to General Relativity II (also PHYS 6554)**
Spring. 4 credits. Prerequisite: ASTRO 6509. E. Flanagan.

For description, see PHYS 6554.

**ASTRO 6511 Physics of Black Holes, White Dwarfs, and Neutron Stars (also PHYS 6525)**

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. Supersmassive black holes also lie at the heart of the violent processes in active galactic nuclei and central stars. 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**

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**

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**

Aims to provide tools for modeling and detection of various kinds of signals encountered in the physical sciences and engineering. Data mining and statistical inference from large and diverse databases are also covered. Experimental design is to be discussed. Basic topics include probability theory; Fourier analysis of continuous and discrete signals; digital filtering; matched filtering and pattern recognition; spectral analysis; Karhunen-Loeve analysis; wavelets; parameter estimation; optimization techniques; Bayesian statistical inference; deterministic, chaotic, and stochastic processes; image formation and analysis; maximum entropy techniques. Specific applications are chosen from current areas of interest in astronomy, where large-scale surveys throughout the electromagnetic spectrum and using non-electromagnetic signals (e.g., neutrinos and gravitational waves) are ongoing and anticipated. Applications are also chosen from topics in geophysics, plasma physics, electronics, artificial intelligence, expert systems, and geographic programming. The course is self-contained and is intended for students with thorough backgrounds in the physical sciences or engineering.

**ASTRO 6525 Techniques of Optical/Infrared and Submillimeter Astronomy**
Fall. 4 credits. T. Herter.

Optical/infrared and submillimeter telescopes and instrumentation are discussed and related to current research in these fields. Includes telescope design and general optical design (ray tracing). CCD, photodetector, photovoltaic, bolometric band conduction, and heterodyne detection systems are presented. The instrumentation discussion includes general instrument design and specific applications to cameras, spectrometers, and interferometers. Detection limits of various systems, cryogenic techniques, and astronomical data analysis techniques are also discussed. Special topics include speckle interferometry and adaptive optics.

**ASTRO 6530 Astrophysical Processes**

Fundamentals of radiative transfer, bremsstrahlung, synchrotron radiation, Compton scattering, spectral line transfer, gas heating and cooling and topics in atomic and molecular spectroscopy. These are discussed within the framework of astrophysical sources and problems.

**ASTRO 6531 Astrophysical Fluid Dynamics**
Spring. 4 credits. D. Lai.

This course will survey fluid dynamics (including magnetohydrodynamics and some plasma physics) important for understanding astronomical phenomena. Topics include basic fluid and MHD concepts and equations, waves and instabilities of various types (e.g. sound, gravity, Rossby, hydromagnetic, spiral density waves; Rayleigh-Taylor, thermal, Jeans, rotational, magnetorotational instabilities), shear and viscous flows, turbulence, shocks and blast waves, etc. These topics will be discussed in different astrophysical contexts and applications, such as atmosphere and ocean, star and planet formation, compact objects, interstellar medium, galaxies and clusters. This course is intended mainly for graduate students (both theory and observation) interested in astrophysics and space physics. No previous exposure to fluid dynamics is required.

**ASTRO 6560 Theory of Stellar Structure and Evolution (also PHYS 7667)**
Fall. 4 credits. D. Chernoff.

Intended to provide a systematic development of stellar astrophysics, both theory and observations. Topics include hydrostatic equilibrium; equation of state; radiation transfer and atmospheres; convection and stellar turbulence; nuclear burning and nucleosynthesis; solar neutrinos; star formation; pre-main sequence stars; brown dwarfs; end states of stellar evolution (white dwarfs, neutron stars, and black holes); supernovae; interacting binary stars; stellar rotation and magnetic fields; stellar pulsations; winds and outflows. The prerequisites for the course are all undergraduate-level physics. Though helpful, no astronomy background is required.

**ASTRO 6570 Physics of the Planets**

Introductory survey of planetary science with an emphasis on the application of physical principles. Planetary dynamics, including

**ASTRO 6597: Planetary Surface Processes (also EAS 5770)**

Spring: 3 or 4 credits (3 credits for course only; 4 credits if registered for the lab trip—see course description below). J. Bell. Survey of processes involved in the formation and evolution of the surfaces of solar system bodies. Surface morphology and landforms of terrestrial planets, planetary satellites, asteroids, and comets. Fundamentals of impact cratering, volcanicism, tectonism, and erosion as applied to planetary surfaces, with significant emphasis on terrestrial field examples as analogs and study sites. Basic introduction to physical, geochemical, and "space" weathering of planetary surfaces. Basic introduction to field methods and remote sensing techniques and data sets (terrestrial, spacecraft). Students enrolled in the course can participate in an optional field trip over Spring Break to a "classic" planetary process analog field site (e.g., Meteor Crater, Amboy, Hawaii, Grand Canyon, Death Valley) for 1 additional credit. Grading based on participation in discussions, critical literature reviews, and final project/presentation.

**ASTRO 6598: Planet Formation and Evolution (also EAS 5760)**

Fall. 4 credits. J.-L. Margot and M. Pritchard. Survey of chemical and physical processes important to the origin and evolution of planetary systems. The first part of the course will cover the formation context of planets including the astronomical conditions, nucleosynthesis, meteoritics, condensation sequence, accretion, dynamical evolution, and observational constraints (disks, exoplanets, major planets, satellites, and small bodies). The second part of the course will cover planetary internal structure and evolution including melting, differentiation, core formation, convection, thermal evolution, and magnetic fields.

**ASTRO 6599: Cosmology (also PHYS 6599)**

Spring. 4 credits. Prerequisites: statistical physics, quantum mechanics, and electromagnetic theory courses. Next offered 2009–2010. 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](https://example.com)**

Spring. 2 credits. Prerequisites: for advanced undergraduates, by permission of instructor. Recommended: some background in astronomical spectroscopy. Next offered 2009–2010. R. Giovanelli, M. Haynes, and J. Houck. "Dwarf Galaxies: The View from 1 Meter to 1 Micron." CDM theory describes the growth of structure through the merger of small halos formed in large numbers early on, and while these small halos serve as the building blocks of galaxy clusters, many low mass objects are nonetheless expected to survive to the present epoch. In this seminar, we will explore our current understanding of dwarf galaxies, their impact on hierarchical structure development and the clues about galaxy evolution and evolution they carry with them especially as viewed using today's long wavelength foreground instruments Spitzer, ALFA and the VLA and, in the future, ALMA and CCAT.

**[ASTRO 7621: Seminar: Planetary Radar Astronomy](https://example.com)**

Spring. 3 credits. Prerequisites: upper-level undergraduates and graduate students in Astronomy, engineering, and geology; good background in undergraduate mathematics and physics. Next offered 2009–2010. 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)](https://example.com)**


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 dominated accretion flows, fast dynamo processes in astrophysics.

**[ASTRO 7671: Seminar: Classic Papers in Planetary Science](https://example.com)**

Fall. 3 credits. Next offered 2009–2010. J.-L. Margot. This reading seminar is designed to review seminal papers in planetary science. Required readings will be selected for their pedagogical aspects and will be discussed in-depth in class. Faculty, staff, and students will make presentations from the readings.

**[ASTRO 7671: Seminar: Planetary Science—Composition and Mineralogy of the Martian Surface (also EAS 6930)](https://example.com)**

Spring. 5 credits. Next offered 2009–2010. J. Bell. This course will review our current knowledge of the composition, mineralogy, and physical properties of the surface of Mars, using the latest available data and analyses from space missions like the Mars Exploration Rovers and the Global Surveyor, Odyssey, Mars Express, and Reconnaissance orbiters. Lectures will follow the chapters of the 2007 Cambridge University Press book on this same topic (edited by J. Bell), and will be augmented by student in-class literature reviews. Grades will be based on in-class reviews, discussions, and a final term paper/presentation.

**[ASTRO 7671: Seminar: Planetary Science—Stars, Rocks, and Between](https://example.com)**

Spring. 3 credits. Next offered 2009–2010. J. Lloyd. This seminar will discuss the theoretical and observational aspects of the formation, structure and evolution of low mass objects in the Universe: red dwarf stars, brown dwarfs, jovian and terrestrial exoplanets. The seminar will focus particularly on aspects of low mass stars and substellar objects of recent progress and of relevance to ongoing extrasolar planet research programs.


Spring. 3 credits. Next offered 2009–2010. J. Houck, J. Lloyd, and G. Stacey. Covers topics of current interest in infrared and submillimeter astrophysics, including extrasolar planets; star formation in the galaxy; nearby dwarf, starburst, and ultraluminous galaxies; and distant "proto"-galaxies. Recent results obtained with Spitzer Space Telescope and ground-based facilities are covered. The seminar includes lectures from faculty and staff and also student presentations from the readings during the course.

**[ASTRO 7671: Seminar: The Nature and Exploration of Comets](https://example.com)**

Fall. 3 credits. J. Veverka. The course will review the current understanding of comets and of their role in the evolution of the solar system. Particular attention will be given to results obtained by recent spacecraft missions to comets and to plans for the future exploration of these bodies.
Biology & Society Major


ADMISSION TO THE MAJOR

All students should have completed a year of college-level biology before submitting an application during their sophomore year. Juniors are considered on a case-by-case basis. Upper-division applicants should realize that 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 sequence 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 sequence. 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.
Major Requirements

No single course may satisfy more than one major requirement. All courses must be taken for a letter grade.

1. Basic courses
   a. Biology foundation (breadth requirement): three courses; one from each from three of the following subject areas: biochemistry, molecular and cell biology (BIOB 2100 or 3110 or 3210); neurobiology (BIONB 2220); and development (BIOGD 2801 or 2810 or 2820 or PLBR 2250); evolutionary biology (BIOEE 2780); animal behavior (BIONB 2210, BIOBM 3290); neurobiology (BIONB 2220); anatomy and physiology (BIOAP 3110); and general division (BIOP 2410 or BIOI 2900 or BIOEE 3730 or 2740 or 4500 or 4700 or 4720 or 4750 or 4760 or ENOM 2120 or PLPA 3010 or 3090 or BIOBM 3100 or 3740 or 3770 or 4490); nutrition (NS 1150).
   b. College calculus (one course): MATH 1106, 1110, 1120 or any other higher-level calculus.
   c. Recommended but not required: General chemistry (one-year sequence) (prerequisite to biochemistry and other chemistry courses): CHEM 1560, 2070–2080, or 2150–2160.

2. 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.

   a. Ethics: one course; BSOC 2051 (also PHIL 2460, 2860). Human Nature (also PHIL 2860).
   b. Social sciences/humanities foundation: two courses; one from any two of the following subject areas: history of science; philosophy of science; sociological science; politics of science; and science communication.
   c. Biology foundation (breadth requirement): three courses; one from each of the following subject areas: biochemistry, molecular and cell biology (BIOB 3580 or 3510 or 3530 or NS 3200); ecology (BIOEE 2610, BIOSM 3640, BIOSM 3750); genetics and development (BIOGD 2801 or 2810 or 2820 or PLBR 2250); evolutionary biology (BIOEE 2780); animal behavior (BIONB 2210, BIOBM 3290); neurobiology (BIONB 2220); anatomy and physiology (BIOAP 3110); and general division (BIOP 2410 or BIOI 2900 or BIOEE 3730 or 2740 or 4500 or 4700 or 4720 or 4750 or 4760 or ENOM 2120 or PLPA 3010 or 3090 or BIOBM 3100 or 3740 or 3770 or 4490); nutrition (NS 1150).
   d. Biology foundation (Depth requirement): one biology course for which one of the above (2c) is a prerequisite.
   e. Statistics: one course selected from MATH 1710, BTRY 3010, AEM 2100, SOC 3010, PSYCH 3500, ECON 3190, PAM 2100, ILRST 2100 or 2120.

3. Core Course (one course). Should be completed by end of junior year.

   a. 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.
   b. Humanities/social sciences electives (two courses). Courses from the list of senior seminars may be used as thematics electives if not used to meet another requirement, or select humanities or social sciences courses in consultation with the faculty advisor.
   c. 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 as a prerequisite is available in 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.

Biological & 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 in 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 advisor. 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 is now cross-listed with the College of Agriculture and Life Sciences as ALS 4991 and the College of Human Ecology as HE 4990. Students wishing to receive CALS credit must sign up for ALS 4991 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: Nancy Breen, advising coordinator, CHE, neb5@cornell.edu

Further Information

Professor Brian Chabot, director of undergraduate studies and advising coordinator, College of Agriculture and Life Sciences, bfc1@cornell.edu

Dr. Nancy Breen, advising coordinator, College of Human Ecology, neb5@cornell.edu

Susan Sullivan, Biology & Society Advising Office, 306 Rockefeller Hall, 255-6047, sfc1@cornell.edu

web site: www.sfs.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

ST S1101 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. J. Reppr.

For description, see STS listings, STS 1101.

ST S1102 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. S. Seth.

For description, see STS listings, STS 1102.
II. 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.
Aims to acquaint students with moral issues that arise in the context of the environment and environmental policy. Our concerns about the environment bring to our attention the importance of economic, epistemological, legal, political, and social issues in assessing our moral obligations to other humans and the natural world. The attempt is then to explore how different factors come into play in defining our responsibilities to the environment and to examine the grounds for our environmental policy decisions. A background in basic ecology or environmental issues or ethics is helpful.

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 3510)]

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]
For description, see STS 2331.

STS 2811 Science in Western Civilization: Medieval and Early-Modernd Europe up to Isaac Newton (also HIST 2810)
Fall. 4 credits. May be taken for Foundation credit if course time period better meets students theme/interest, STS 2821 preferred for major. P. Dear.
For description, see HIST 2810.

STS 2821 Science in Western Civilization: Newton to Darwin, Darwin to Einstein (also HIST 2820)
Spring. 4 credits. P. Dear.
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. J. Ratchfiff.
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]
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. Fall, W. Provine; summer, A. MacNeill.
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. 4 credits. T. Pinch.
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 3811)
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. Steedman.

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. J. Crane.
For description, see “Core Courses,” BSOC 3011.

BSOC 3311 Environmental Governance (also NTRES 3310, STS 3311)
Spring. 3 credits. S. Wolf.
For description see NTRES 3310.

BSOC 4421 Sociology of Science (also CRP/SOC 4420, STS 4421)
Fall. 4 credits. 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.

[HID 4520 Culture and Human Development]
For description, see HD 4520.

NS 2450 Social Science Perspectives on Food and Nutrition
Fall. 3 credits. C. Bisogno 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. 4 credits. T. Pinch.
For description, see STS listings, STS 2011.

STS 3111 The Sociology of Medicine (also SOC 3130)
Spring. 4 credits. Not open to freshmen. C. Leuenberger.
For description, see STS listings, STS 3111.

[STS 4111 Knowledge, Technology, and Property]
For description, see STS 4111.

4. Politics of Science

BSOC 3311 Environmental Governance (also NTRES 3310, STS 3311)
Spring. 3 credits. S. Wolf.
For description see NTRES 3310.

[BSOC 4071 Law, Science, and Public Values (also STS 4071)]
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)
Spring. 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. J. Reppy.
For description, see STS 3991.
5. Science Communication

COMM 4210 Communication and the Environment
Fall. 3 credits. Taught at the Shoals Marine Laboratory; not open to freshmen. Offered alternate years. K. McComas.
For description, see COMM 4210.

STS 2851 Communication in the Life Sciences (also COMM 2850)
Spring. 3 credits.
For description, see COMM 2850.

STS 3521 Science Writing for the Mass Media (also COMM 3520)
Fall. 3 credits. B. Lewenstein.
For description and prerequisites, see COMM 3520.

STS 4660 Public Communication of Science and Technology (also COMM 4660)
Spring. 3 credits. Limited to 15 students. May be used in Foundation only if not taken as senior seminar. Offered even-numbered years. Staff.
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

BIOMB 3300 Principles of Biochemistry, Individualized Instruction
Fall and spring. 4 credits. J. Blankenship, P. Hinkle, and staff.
For description and prerequisites, see BIOMB 3300.

BIOMB 3310 Principles of Biochemistry: Proteins and Metabolism
Fall. 3 credits. May not be taken for credit after BIOMB 3300 or 3330. G. Feigenson.
For description and prerequisites, see BIOMB 3310.

BIOMB 3330 Principles of Biochemistry, Lectures
Summer, six-week session. 4 credits. S. Ely.
For description and prerequisites, see BIOMB 3330.

[NS 3200 Introduction to Human Biochemistry
For description and prerequisites, see NS 3200.]

2. Ecology

BIOEE 2610 Ecology and the Environment
Fall and summer. 4 credits. Not open to freshmen. Fall, A. Kessler, C. Goodale, and staff; summer, A. Vawter.
For description and prerequisites, see BIOEE 2610.

BIOSM 3640 Field Marine Science
Summer. 6 credits. Taught at the Shoals Marine Laboratory; for more information and application, contact the SML office at G14 Simson Hall. Staff.
For description and prerequisites, see BIOSM 3640.

BIOSM 3750 Field Marine Biology and Ecology
Summer. 6 credits. Taught at the Shoals Marine Laboratory; for more information and application, contact the SML office at G14 Simson 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.

PLBR 2250 Plant Genetics
Spring. 3 credits. P. Gregory.
For description, see PLBR 2250.

4. Evolutionary Biology

BIOEE 2780 Evolutionary Biology
Fall, spring, and summer. 3 or 4 credits. Fall, I. Lovette; spring, staff.
For description, see BIOEE 2780.

5. Animal Behavior

BIOMB 2210 Neurobiology and Behavior I: Introduction to Behavior
Fall. 3, 4, or 5 credits. R. A. Raguso and staff.
For description and prerequisites, see BIOMB 2210.

BIOSM 3290 Ecology of Animal Behavior
Summer. 4 credits. Taught at the Shoals Marine Laboratory; for more information, contact the SML office at G14 Simson Hall. Staff.
For description and prerequisites, see BIOSM 3290.

6. Neurobiology

BIOMB 2220 Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits. J. R. Fecho and staff.
For description and prerequisites, see BIOMB 2220.

7. Physiology and Anatomy

BIOP 3110 Introductory Animal Physiology, Lectures (also VTBSM 3460)
Fall. 3 credits. M. Mudd.
For description and prerequisites, see BIOP 3110.

8. Biological Diversity

BIOEE 2740 The Vertebrates: Structure, Function, and Evolution
Spring. 4 credits. K. Zamudio.
For description and prerequisites, see BIOEE 2740.

[BIOEE 3730 Biology of the Marine Invertebrates
For description and prerequisites, see BIOEE 3730.

BIOEE 4500 Mammalogy (Lecture)
Spring. 3 credits. 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. H. Greene.
For description and prerequisites, see BIOEE 4700.

BIOEE 4701 Herpetology, Laboratory
Spring. 2 credits. Must be taken in conjunction with 4701 to count for major credit. Offered alternate years. H. Greene.
For description and prerequisites, see BIOEE 4701.

[BIOEE 4750 Ornithology
For description and prerequisites, see BIOEE 4750.

BIOEE 4760 Biology of Fishes
Fall. 4 credits. 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.

BIOL 2410 Introductory Botany
Fall. 3 credits. K. Niklas.
For description, see BIOL 2410.

BIOSM 3100 Marine Symbiosis
Summer. 4 credits. Taught at the Shoals Marine Laboratory; for more information, contact the SML office at G14 Simson Hall. Staff.
For description and prerequisites, see BIOSM 3100.

BIOSM 3740 Field Ornithology
Summer. 4 credits. Taught at the Shoals Marine Laboratory; for more information, contact the SML office at G14 Simson Hall. Staff.
For description and prerequisites, see BIOSM 3740.

BIOSM 3770 Diversity of Fishes
Summer. 4 credits. Taught at the Shoals Marine Laboratory; for more information, contact the SML office at G14 Simson 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 the Shoals Marine Laboratory; for more information, contact the SML office at G14 Simson 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. M. Milgroom.
For description, see PLPA 3010.

PLPA 3090 Fungi
Fall. 3 credits. K. Hodge.
For description and prerequisites, see PLPA 3090.

9. Nutrition
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. Vanits.
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 and spring. 4 credits. Fall, F. Molinari; spring: staff.
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. S. Abdus, J. Lewis, S. Unur, 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. Staff.
For description, see SOC 3010.

IV. Core Courses
BSOC 3011 Life Sciences and Society (also STS 3011) (SBA-AS)
Fall. 4 credits. J. Crane.
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 2863)
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 6731)
Fall. 3 credits. Next offered 2009–2010. K. Kennedy.
For description, see BIOEE 6730.]

BIOG 3050 Basic Immunology (also VETMI 3150)
Fall. 5 credits. J. Marsh.
For description, see VETMI 3150.

[BIOPL 2470 Ethnobiology
Fall. 3 credits. Offered alternate years; next offered 2009–2010. Staff.
For description, see BIOPL 2470.]

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)
For description, see ENTOM 2100.]

[BSOC 2141 Biological Basis of Sex Differences (also BIOAP/FGSS 2140) (PBS)
Fall. 3 credits. Offered even-numbered years; next offered 2010–2011. 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. 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 3090, 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. Morgan, and C. D. Harvell.
For description, see EAS 3510.

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.

[HD 2220 Biological Issues in Human Development: The Human Brain and Mind
Fall. 3 credits. Next offered 2000–2010. Staff.
For description, see HD 2220.]

HD 2600 Introduction to Personality (also PSYC 2750)
Fall. 3 credits. R. Depue.
For description, see HD 2600.

[HD 3200 Human Developmental Neuropsychology: Neuobiology of Human Diseases and Disorders
For description, see HD 3200.]

HD 3370 Language Development (also COGST/PSYC 4360, LING 4436)
Spring. 4 credits. 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 4330 Developmental Cognitive Neuroscience
Spring. 3 credits. May be used as depth course if BION 2210 or 2220 taken as breadth. Next offered 2009–2010. Staff.
For description, see HD 4330.]

HD 4660 Psychobiology of Temperament and Personality
Fall. 3 credits. R. Depue.
For description and prerequisites, see HD 4660.

NS 2220 Maternal and Child Nutrition
Spring. 3 credits. Limited to 25 students.
P. Brazam.
For description and prerequisites, see NS 2220.

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 3310 Physiological and Biochemical Bases of Human Nutrition
Spring. 4 credits. C. McCormick.
For description and prerequisites, see NS 3310.
[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. S. Travis.
For description, see NS 4210.

[NS 4750 Mechanisms of Birth Defects]
Spring. 3 credits. 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. 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 3000 Animal Reproduction and Development]
Spring. 3 credits. J. Parks.
For description, see ANSC 3000.

[HD 4660 Psychobiology of Temperament and Personality]
Fall. 3 credits. 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.

[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 Co-Existence]
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.

[BSOC 3431 Biotechnology and the Environment (also STS 3431) (SBA-AS)]
For description, see STS 3431.

[BSOC 3541 Sociology of Contemporary Cultures (also SOC 3520, STS 3541)]
For description, see STS 3541.

[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. L. Williams.
For description, see DSOC 2010.

[DSOC 2050 Rural Sociology and International Development (also SOC 2060)]
Spring. 3 credits. P. Michael.
For description, see DSOC 2050.

[DSOC 2650 Latinos in the U.S.A. (also LSP 2201)]
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. R. Depue.
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 2009–2010. 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 4570 Health and Social Behavior (also SOC 4570)]
Fall. 3 credits. Next offered 2010–2011. 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 the Instructor. S. Travis.
For description and prerequisites, see NS 4210.

[NS 4500 Public Health Nutrition]
Spring. 3 credits. K. Rasmussen and D. Pelletier.
For description and prerequisites, see NS 4500.

[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. D. Pelletier and G. Pelto.
For description and prerequisites, see NS 6500.

[NTRES 4310 Environmental Strategies (also DSOC 4320)]
Spring. 3 credits. S. Wolf.
For description, see NTRES 4310.

[PAM 3370 Racial and Ethnic Differentiation (also SOC 3370)]
Spring. 3 credits. A. Sassler.
For description, see PAM 3370.
Biology & Society Major 493

PAM 3500 Contemporary Issues in Women's Health (also FGSS 3500)  
Fall. 3 credits. Next offered 2009–2010.  
A. Parrot.  
For description, see PAM 3500.

PAM 3800 Human Sexuality  
Spring. 4 credits. A. Parrot.  
For description, see PAM 3800.

PAM 4350 U.S. Health Care System  
Fall. 3 credits. S. Nicholson.  
For description, see PAM 4350.

PAM 4370 Economics of Health Policy  
Spring. 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.  
For description, see PHIL 4810.

C. Senior Seminars  
BSOC 4021 Bodies in Medicine, Science and Technology (also FGSS/STS 4021) (sr sem)  
Spring. 4 credits. R. Prentice.  
For description, see STS 4021.

BSOC 4161 Microbes and Food: Contemporary Issues Affecting Humanity (also PLPA 4160)  
Spring. 4 credits. S. Beer.  
For description, see PLPA 4160.

BSOC 4181 Environments and Waterscapes (also AMST/HIST/SHUM 4380, SOC 4380)  
Spring. 4 credits. J. Crane.  
For description, see STS 4380.

BSOC 4210 Medicine, Science and the Body in Postcolonial Africa (also STS 4210)  
Spring. 4 credits. J. Crane.  
For description, see STS 4210.

BSOC 4291 Politics of Science  
For description, see GOVT 4290.

BSOC 4381 Environments and Waterscapes (also AMST/HIST/SHUM 4813, STS 4381)  
Fall. 4 credits. A. Sachs  
For description see SHUM 4813.

BSOC 4421 The Sociology of Science (also SOC 4420, STS 4421)  
Spring. 4 credits. T. Pinch.  
For description, see STS 4421.

BSOC 4471 Seminar in the History of Biology (also BIOEE 4670, HIST 4150, STS 4471) (PBS)  
Fall and summer. six-week session. 4 credits. Fall. W. Provine; summer: A. MacNeill.  
For description, see BIOEE 4670.

BSOC 4611–4612 Environmental Policy (also ALS/BIOEE 6610–6611) (PBS)  
Fall and spring (yearlong). Students must enroll in both BSOC 4611 and BSOC 4612. 3 credits each semester. Limited to 12 students. D. Pimentel.  
For description and prerequisites, see BIOEE 6610–6611.

[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 2009–2010. 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 4961 History of Medicine in China (also ASIAN/HIST/STS 4961)  
Spring. 4 credits. T. J. Hinchliff.  
For description, see HIST 4961.

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. 4 credits. R. Herring and J. Thies.  
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)  
For description, see DSOC 4380.

[HD 3360 Connecting Social, Cognitive, and Emotional Development  
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. C. J. Brauer.  
For description, see HD 4140.

[HD 4180 Aging: Contemporary Issues  
For description, see HD 4180.

HD 4190 Midlife Development  
Fall. 3 credits. 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  
For description, see HD 4310.

[HD 4320 Cognitive, Social, and Developmental Aspects of Scientific Reasoning (also COGST 4320)  
Fall. 3 credits. B. Kosloski.  
For description, see HD 4320.

[HD 4640 Adolescent Sexuality (also FGSS 4670)  
Fall. 3 credits. Next offered 2009–2010. R. Savin-Williams.  
For description, see HD 4640.

HD 4660 Psychobiology of Temperament and Personality  
Fall. 3 credits. R. Depue.  
For description and prerequisites, see HD 4660.

HD 4680 Stress in Childhood and Adolescence  
Spring. 3 credits. J. Eckerdorff.  
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 4520 Molecular Epidemiology and Dietary Markers of Chronic Disease  
For description, see NS 4520.

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. J. Kuder.  
For description see PAM 4570.

[PAM 5520 Health Care Services: Consumer and Ethical Perspectives  
For description, see PAM 5520.

[PAM 5560 Managed Care  
Fall. 3 credits. For undergraduate seniors only, by permission of instructor. Next offered 2009–2010. J. Kuder.  
For description, see PAM 5560.

[STS 4111 Knowledge, Technology, and Property  
For description, see STS 4111.

[STS 4221 New York Women (also FGSS 4220, HIST 4450)  
For description, see STS listing, STS 4221.]
Biology and Society Office, 306 Rockefeller Hall. Arts and Sciences students who are admitted to the honors program may select an appropriate program in the College of Engineering. There is no special undergraduate degree program under the direction of a Biology and Society faculty member willing to serve as faculty advisor; at least one of these must be a member of the Biology and Society faculty. Applications for research projects are accepted by individual faculty members. Students must register for the total credits desired for the whole project each semester (e.g., 8 credits for fall and 8 credits for spring). 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. Minimal, 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 interdisciplinary 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 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."

CHEMISTRY AND CHEMICAL BIOLOGY
B. A. Baird, chair (122 Baker Laboratory, 259-4175); D. B. Collum, associate chair; P. J. Chirik, director of undergraduate studies; H. D.Abrunh, B. A. Baird, T. P. Begley, R. A. Cerione, G. Chan, P. Chen, P. J. Chirik, G. W. Coates, D. B. Collum, B. R. Crane, H. F. Davis, W. R. Dichtel, F. J. DiSalvo, S. F. Ellick, G. S. Ezra, J. H. Freed, B. Ganem, M. A. Hines, R. Hoffmann, P. L. Houston, S. Lee, H. Lin, R. F. Loring, J. A. Marohn, T. McCarrick, N. J.ardarrison, J. Park, D. Y. Sogah, J. Terry, D. A. Usher, B. Widom, P. T. Wolczanski, D. R. 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 2510 + 2900 + 3000 (CHEM 3010 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 300 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 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 2009–2010. 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.

Department of Education, 255-2207.
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 F; prelims, Oct. 9, Nov. 13, Feb. 24, April 7. Fall: D. B. Zax; spring: P. T. Wolczanski. Covers fundamental chemical principles, with considerable attention given to the qualitative aspects and techniques important for further work in chemistry.

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. 12, Mar. 10, Apr. 7. T. P. Begley. 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 2000) 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. 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. 9, Nov. 13, Feb. 24, April 7. Fall: D. B. Zax; spring: P. T. Wolczanski. Covers fundamental chemical principles, with considerable attention given to the quantitative aspects and techniques important for further work in chemistry.

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 2150, fall; CHEM 2160, spring. 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 F; prelims, Oct. 9, Nov. 13, Feb. 24, Apr. 2. Fall: H. F. Davis; spring: G. Chan. Intensive systematic study of the laws and concepts of chemistry, with considerable emphasis on quantitative aspects. First semester covers thermochromy, kinetics, and equilibria. Second semester includes systems 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 F; prelims, fall, Nov. 18; spring: Apr. 23. 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 2520 Elementary Experimental Organic Chemistry

Spring, 2 credits. Prerequisite: CHEM 2510. Lec, T; lab, W; prelim, Apr. 24. Next offered 2009-2010 Staff. Continuation of CHEM 2510. Focus is on structural elucidation of organic compounds and synthesis of biologically interesting organic compounds.

CHEM 2870-2880 Introductory Physical Chemistry (PBS)

2870, fall; 2880, spring. 3 credits each semester. Prerequisite: CHEM 2080 or 2160 and MATH 1110-1120 and PHYS 2208, or permission of instructor; for CHEM 2870, CHEM 2870 or 3890. Lec, M W F; 2870: disc, M or W, T; 2880: disc, M or W, T; prelims, 2870: Oct. 9, Nov. 25, 2880: Mar. 5, Apr. 14. Fall: J. H. Freed; spring: P. Chen. Survey of the fundamental principles of physical chemistry, focusing in the fall on thermodynamics, and an introduction to quantum mechanics. In the spring the course is oriented to the application of physical chemistry to biological systems, including statistical mechanics, phenomena in condensed phases, electrochemistry, spectroscopy. CHEM 2870 satisfies the minimum requirement for physical chemistry in the alternative chemistry major.

CHEM 2900 Introductory Physical Chemistry Laboratory

Fall or spring. 2 credits each semester. Lec, fall, R; spring, R; lab, fall, M T; spring, M T R. F. T. McCarrick. 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; prelims, Oct. 23. 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 T R. F. H. D. Abruña. Instrumental methods of analysis, including chemical microsopy, visible and infrared spectroscopies, and gas chromatography. Basic concepts of interfacing are covered.

CHEM 3020 Honors Experimental Chemistry II (PBS)

Fall. 4 credits. Limited enrollment; priority given to chemistry majors. Prerequisite: CHEM 3010. Lec, M W T R: 2 labs, M W T R. F. H. D. Abruña. Introduction to experimental physical chemistry, including topics in spectroscopy and kinetics. The analysis and numerical simulation of experimental data is stressed.

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 T R. D. A. Y. Sogah. 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. Lec, M W F optional disc may be offered: preims, Sept. 25, Oct. 11, Nov. 13, Feb. 12, Mar. 10, Apr. 9. Fall: J. Njardarson; spring: D. Y. Sogah.
Study of the more important classes of carbon compounds—especially those encountered in the biological sciences. Emphasizes their three-dimensional structures, mechanisms of their characteristic reactions, their synthesis in nature and the laboratory; methods of identifying them, and their role in modern science and technology.

**CHEM 3590–3600 Honors Organic Chemistry I and II (PBS)**

Fall, 3590; spring, 3600. 4 credits each semester. Limited enrollment. Prerequisites: CHEM 2080 or CHEM 2160 or permission of instructor. Recommended: coregistration 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. 25, Oct. 21, Nov. 13; Spring: Feb. 12, Mar. 10, Apr. 9. 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. Lec, fall: CHEM 3890, CHEM 3890. Lec: CHEM 3890: M W F; rec, M, T, or W, Lec: CHEM 3890: M W F; disc, W; prelims: 3890, Sept. 30, Oct. 28, Nov. 25, 3900, Feb. 12, Mar. 10, Apr. 9. Fall, M. A. Hines; 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**


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. 25, Oct. 21, Nov. 13, CHEM 4100. Systematic study of the synthesis, structure, bonding, reactivity, and uses of inorganic, organometallic, and solid-state compounds.

**CHEM 4110 Introduction to Inorganic Chemistry Research**

Fall or spring. 2–4 credits. Prerequisites: CHEM 3050 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 3050 and 3890–3900 or average of B– or better 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)**


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 BIOMG 4500) (I) (PBS)**

Fall. 3 credits. Prerequisites: CHEM 3570–3580, 3590–3600 or equivalent. Lec, T. R. T. Begley.

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. S. Edick.

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. Emphasis will be placed on understanding the way in which the three-dimensional arrangement of atoms determines the biological properties of both small molecules and macromolecules, such as proteins and enzymes. The study of molecular structure will be aided by the use of interactive computer graphics for visualizing three-dimensional structures of molecules.

**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 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 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 the 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. D. Collum.

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**

Fall 6000; spring, 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 recognized resources in chemistry, physics, biochemistry, and materials science; and managing citations.

**CHEM 6050 Advanced Inorganic Chemistry II: Symmetry, Structure, and Reactivity**

Fall. 4 credits. Prerequisite: CHEM 3580–3590 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 Eschenmoser’s Molecular 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. P. 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
CHEM 6070 Advanced Inorganic Chemistry III: Solid-State Chemistry
Spring. 4 credits. Prerequisite: CHEM 6050, 6060, or permission of instructor. M W F, Next offered 2009–2010. 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 Organometallic Chemistry by Collman, Hegedus, Finke, and Norton and Organometallic Chemistry of the Transition Metals by Crabtree.

CHEM 6090 Electrochemistry
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.

CHEM 6500–6510 Organic and Organometallic Chemistry Seminar
Fall, 6500, spring, 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. B. Ganem.
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. BIOLM 3300 or permission of instructor. Lec, M W F. 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 non-ribosomal peptide antibiotics; Antibiotic resistance mechanisms and strategies to overcome antibiotic resistance. Protein posttranslational modifications (PTM): Types of enzyme-catalyzed PTM; Mechanism of enzymatic reactions involved in PTM; Effects of PTM on protein structure and function; PTM-related human diseases; and drugs that target PTM enzymes. A general review, specifically tailored for chemistry/biochemistry students, of the history and background of each topic will be given, followed by discussion of recent literature on the topic.

CHEM 6680 Chemical Aspects of Biological Processes
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 biochemistry 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. 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. Subsequent modules on organic and polymer synthesis are then presented. Topics of current interest are emphasized.

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 CHEME 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. N. Next offered 2009–2010. 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 6220 Chemical Communication

CHEM 6250 Advanced Analytical Chemistry I
Spring. 4 credits. Prerequisite: CHEM 2880 or 3890 or equivalent. Lec, M W F. Next offered 2009–2010. 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 7900 or equivalent preferable. Lec, M W F. Next offered 2009–2010. 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 multiple 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 520, or CHEM 2080 and PHYS 229, or permission of instructor. Lec, T. R. Offered alternate years. 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, thermal ionization MS, inductively coupled plasma MS, atomic spectroscopy, ion and electron microscopies, X-ray and electron spectroscopies, and biological and solid state applications. The first five weeks focus on IRMS instruments.
[CHEM 6720] Kinetics and Regulation of Enzyme Systems
Spring. 4 credits. Primarily for graduate students. Prerequisite: CHEM 2880 or 3900, or equivalents. Lec, M W F. Next offered 2009–2010. 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 2009–2010. D. A. Usher. Structure, properties, synthesis, and reactions of nucleic acids from a chemical point of view. Special topics include RNAI, antisense and antigenic technology, ribozyme reactions (including the ribosome), mutagens, PCR, recent advances in sequencing, RNA 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 2009–2010. 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. Lec, M W F. P. Chen. 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. Dates TBA. Distinguished scientists who have made significant contributions to chemistry will come to Cornell for one-day symposiums, which will take place on Saturdays (dates to be announced). 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 2009–2010. 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 4445 or CHEM 7930 or 7940 are at substantially higher level than what is needed. Lec, M W F. Next offered 2009–2010. S. Lee. Examines some principles of crystallography and also electronic structure theory of solids. We then consider properties such as conduction, superconductivity, ferromagnetism and ferromagnatism. The final portion of this course is concerned with structure-property relations.

[CHEM 7560] Physical Organic Chemistry I
Spring. 4 credits. Primarily for graduate students. Prerequisite: CHEM 6650 or permission of instructor. Lec, M W F. Next offered 2009–2010. Staff. Explores contemporary tools for calculating molecular structures and energies of species of all sizes. The computer extensively but requires only a limited knowledge of mathematics (mainly linear algebra).

[CHEM 7740] Chemistry of Natural Products: Combinatorial Chemistry
Spring. 3 credits. Prerequisites: CHEM 5000 and BIOBM 3500 or equivalent. Lec, M W F. Next offered 2009–2010. T. P. Begley. Combinatorial chemistry has revolutionized the way organic chemists think about structure function studies on biological systems and the design of inhibitors. 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 7770] 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. G. S. Ezra. 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; 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. 5 credits. Prerequisite: permission of instructor. Lec, T R. Next offered 2009–2010. 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: crystalization, data collection, phasing methods, model building, refinement, structure validation, and structure interpretation.
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 CHEM 7870, CHEM 7870 or equivalent or permission of instructor. Lec, M W F. J. Arlohn.
Topics include: The density matrix, interaction of radiation with matter, unitary evolution in the two-level system, interaction representation, pulsed excitation, adiabatic rapid passage, non-unitary evolution, correlation functions, Bloembergen-Purcell-Pound relaxation theory, re-equilibration of populations, dephasing of coherences, saturation, hole-burning, and echoes; time-dependent perturbation theory, Fermi’s Golden rule, second quantization, stimulated emission, spontaneous emission, the Magnus expansion and average Hamiltonian theory, multi-dimensional pulsed spectroscopy; Gaussian wavepackets, femtosecond pulse-pair excitation, vibrational-electronic spectroscopy, the Raman effect, electron transfer, rates of chemical reactions, intermolecular forces, scattering.

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. J. Arlohn.
Topics include: Schrodinger’s equation, wave packets, uncertainty principle, matrix and operator mechanics, orbital and spin angular momentum, exclusion principle, perturbation theory, and the variational principle. At the level of R. Shankar, Quantum Mechanics.

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. (Students interested in taking CHEM 7950 in spring 2009 should consider CHEME 7110 for fall 2008. Next offered 2009–2010. Lec, M W F. G. Chan.)

CHEM 7960 Statistical Mechanics
Spring. 4 credits. Prerequisites: CHEM 7950, CHEM 7920, CHEM 7610 or equivalent. Lec, T R. F. Loring.
Continuation of CHEM 7950 (not offered in fall 2008. Students interested in CHEM 7960 in spring 2009 should consider taking CHEME 7110 in fall 2008.) Statistical mechanics of interacting systems. Topics include fluid state theory, computational statistical mechanics, critical phenomena, renormalization group theory, and an introduction to nonequilibrium statistical mechanics.

CHEM 7980 Bonding in Molecules
Spring. 4 credits. Prerequisite: some exposure to quantum mechanics, good understanding of physical chemistry course or CHEM 6810 or CHEM 7930–7940 at substantially higher level than what is needed; students should consult instructor if in doubt. Lec, T R. Next offered 2009–2010. R. Hoffman.
Aims to build a qualitative picture of bonding in all molecules, including organic, inorganic, organometallic systems and extended structures (polymer, surfaces, and three-dimensional materials).

CHINA AND ASIA–PACIFIC STUDIES
web site: www.einaudi.cornell.edu/caps

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.

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 3501–3502 or CHIN 3306 (CAPS 3060) or CHIN 1109–1110 for heritage learners of 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 4060/ECON 4690.
- All of the following seminars: CAPS 3000 and CAPS 5000 (during fall of junior year at Cornell), 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, non-governmental 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 thesis 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 Reform (also GOVT 2403)
Fall. 3 credits.
For description, see GOVT 2403.

CAPS 2570 China Encounters the World (also ASIAN 2257, HIST 2571) (HA-AS)
Fall. 4 credits. X. Xu.
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 on 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. Grades in this class will be calculated on the basis of class participation, quizzes, midterm and final exams, and one essay assignment.

CAPS 2827 China and the World (also GOVT 2827) (CA-AS)
Spring. 4 credits. A. Carlson and A. Mertha.
This course comes to terms with the dramatic rise of China by reviewing Chinese foreign policy since the establishment of the People’s Republic of China. In particular, it concentrates on major developments during the 1980s and 1990s. Such a wide-ranging survey encompasses not only China’s relations with its major bilateral partners but also its broader relationship with the international system.

Courses in Ithaca
CAPS 2940 History of China in Modern Times (also HIST 2940) (HA-AS)
Fall. 4 credits. S. Cochran.
For description, see HIST 2940.

[CAPS 3060 Readings in Chinese History, Culture, Society (also CHIN 3306) @ Spring. 4 credits. Next offered 2009–2010. Z. Chen.
For description, see CHIN 3506.]

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 Twentieth-Century Asian American Relations (also HIST 3520)]

CAPS 3857 Seminar on American Foreign Policy (also GOVT 3857) (SBA-AS)
Fall. 4 credits. P. Katzenstein.
For description, see GOVT 3857.

CAPS 4000 Issues in China and Asia–Pacific Studies
Spring. 4 credits. X. Xu.
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 4020 Honors Thesis Tutorial II
Spring. 4 credits. Prerequisite: CAPS 4010. Staff.

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)]

[CAPS 4930 Problems in Modern Chinese History (also HIST 4930)]
Fall. 4 credits. Next offered 2009–2010.
S. Cochran.
For description, see HIST 2940.

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 2209–2210 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](Next offered in 2009–2010.)

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
Next offered 2009–2010. For description, see CHIN 4426 under “Asian Studies.”

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, GOVT 3301)
Fall. 4 credits. R. Bush.
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 AMST 4997)
Fall. 8 credits. S. Jackson.
For description, see AMST 4997.

CAPS 4998 Politics and Policy: Theory, Research, and Practice (also GOVT 4998)
Fall. 4 credits. S. Jackson.
For description, see GOVT 4997.

CAPS 5000 Politics and Policy: Theory, Research, and Practice (also ALS/AMST/GOVT/PAM 4998)
Fall and spring. 8 credits.
For description, see GOVT 4998.

CHIN 3301 High Intermediate Chinese
Fall. 4 credits.
For description, see CHIN 3301 under “Asian Studies.”

CHIN 4445 Directed Study for CAPS Students in D.C.
Fall. 1–4 credits, variable. Prerequisite: permission of instructor. Intended for advanced language study.

Courses in Beijing
CAPS 3010 China’s Changing Politics, Economy, Society, and Culture
Fall. 4 credits. 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 3020 Chinese Perspectives on China’s Foreign Relations
Fall. 4 credits. 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.


CHIN 4451 Advanced Mandarin for CAPS Students in Beijing
Fall. 4 credits. Equivalent to CHIN 4427 in Ithaca. 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. Staff.

CHIN 4457 High Advanced Mandarin
Fall. 4 credits. Equivalent to CHIN 4427 in Ithaca. Staff.
For description, see CHIN 4427 under “Asian Studies.”

CHINESE
FALCON Program (Chinese)
See Department of Asian Studies.

CLASSICS
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 B.C. In

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 B.C. In

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 B.C. 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 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 numbered 2101 or above; (2) either CLASS 2675/HIST 2650 or one term of CLASS 2681/HIST 2670–CLASS 2682/HIST 2671, or (3) two courses in other related subjects selected in consultation with the student’s departmental advisor (see below). 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 undergraduate majors 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; Cross 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 at 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 major. Both full-year and summer programs are available. Grants of up to $3,725 stipend for 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.

---

**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 undergraduate majors 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; Cross 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 at 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 major. Both full-year and summer programs are available. Grants of up to $3,725 stipend for 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 Requirement

Greek: option 1 is satisfied by taking GREEK 2101 or above. Option 2 is satisfied by taking either (a) LATIN 1201, 1202, and 1105 or (b) LATIN 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.)

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 1201+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 1205.

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 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 tests: e.g., SAT, GRE, MCAT, TOEFL, LSAT, etc.

CLASS 2601 The Greek Experience # (CA-AS)
Fall. 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 the philosophy of 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 2612 The Roman Experience # (CA-AS)
Introduction to the civilization of the Romans as expressed in their literature, religion, and social and political institutions.

CLASS 2632 Paranoia and Conspiracy (also COML 2632) # (LA-AS)
Spring. 3 credits. M. Fontaine.
Conspiracy theory pervades the literature of the ancient world, from Greek drama to Roman history. Historical writers of Ancient Greece and Rome often resort to paranoid and conspiratorial modes of analysis to explain why things happen the way they do. This course examines actual conspiracies in these societies alongside fictional representations of them in a range of texts, together with the rhetoric of self-delusion and fearmongering they engender.

CLASS 2634 Judaism from the Persian Period to the Rise of Islam (also JWST/NEST/RELST 2622)
Spring. 4 credits. J. Lovanovic.
For description, see NES 2622.

CLASS 2651 The Comic Theater (also COML/THETR 2230) # (LA-AS)
Spring. 3 credits. J. Rusten.
The origins of comic drama in ancient Greece and Rome, and its subsequent incarnations especially in the Italian commedia dell’arte (Commedia erudita and Commedia dell’arte), Elizabethan England, 17th-century France, the English Restoration, and Hollywood in the thirties and forties. Chief topics include the growth of the comic theatrical tradition and conventions; techniques and themes of comic plots (trickster, parody, farce, caricature); and the role of comedy in society. All readings in English.

CLASS 2661 Ancient Philosophy (also PHIL 2110) # (KC-AS)
Summer and fall. 4 credits. T. Brennan.
For description, see PHIL 2110.

CLASS 2675 Ancient Greece from Homer to Alexander the Great (also HIST 2650) # (HA-AS)
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 B.C.—the traditional pantheon of “The Glory that was Greece.” Readings will be taken from Greek historians, philosophers, poets and documentary texts. At least two of the (75-minute) lectures will be devoted to art history, delivered by a guest speaker. 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 and a few other fourth-century developments. 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.

CLASS 2680 War and Peace in Greece and Rome (also HIST 2580) # (HA-AS)

CLASS 2681 History of Rome I (also HIST 2670) # (HA-AS)
Fall. 4 credits. Open to first-year students. L. Van Abbeem.
Rome’s beginnings and the Roman Republic. 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). The course is the first part of a two-semester survey of Roman history up to the deposition of the last Roman Emperor in the West (AD 476). Examines the rise of Rome from a village in Italy to an imperial power over the Mediterranean world and consider the political, economic, and social consequences of that development.

CLASS 2682 History of Rome II (also HIST 2671) # (HA-AS)
Spring. 4 credits. Open to first-year students. L. Van Abbeem.
This course is the second part of a two-term survey of Roman history, examines the history
ARTS AND SCIENCES - 2008–2009

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.
For description, see HIST 2061.

[CLASS 3642 Greeks, Romans, and Victorians (also COML 3820) # (LA-AS)]
Spring. 4 credits. F. Aih.
This course explores how 19th-century (and especially Victorian English and Irish) poets, dramatists, and to a lesser extent, novelists, present Greco-Roman antiquity. The varied influences of Vergil and Homer, Seneca and Sophocles, Plutarch and Aristophanes, Horace, and Greek lyric poetry will be discussed in selected works of Thomas Moore, Shelley, Byron, Swinburne, W. S. Gilbert, Oscar Wilde, and the pre-Raphaelites and Victorian poets.

[CLASS 3643 Greek and Roman Mystery Cults (also RELST 3643) # (CA-AS)]
Spring. 4 credits. Recommended: previous course in Classics (civilization or language) or Religious Studies. K. Clinton.
A study of the controversial question of religious continuity between paganism and early Christianity. After a brief survey of Classical mystery cults and Hellenistic religion, the course will focus on such Hellenistic cults as the mystery cults of Isis, Bacchus, and Attis and the Great Mother and on the distinctive features that contributed to their success. Discussion of Christian liturgy and beliefs both in the East and the West to determine what Christianity owed to its pagan predecessors and to isolate the factors that contributed to its triumph over the “rival” pagan cults of late antiquity.

[CLASS 3645 The Tragic Theater (also COML 3440, THETR 3450) # (LA-AS)]
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, Electra, Oedipus’ Antigone; Seneca’s Thyestes, Trojan Women; Shakespeare’s Julius Caesar, Titus Andronicus, Othello; Strindberg’s The Father, Durrenmatt’s The Visit; Bergman’s Seventh Seal; Cacosyannus’ Philebeus.

[CLASS 3662 History of Battle (also HIST 3631) # (HA-AS)]

[CLASS 3664 Aristotle (also PHIL 3203) # (KCM-AS)]
Spring. 4 credits. T. Brennan.
For description, see PHIL 3203.

[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 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 4605 Hellenistic Jewish Literature (also JWST/NEST/RELST 4787) @ (LA-AS)]
Fall. 4 credits. L. Jovanovic.
For description, see NES 4787.

[CLASS 4606/7606 Theater and Spectacle in Greece and Rome (also THETR 4600)]
Spring. 4 credits. J. Rusten.
A study not of the play-texts, but of the social history of the richly documented tradition of competitive artistic performances sponsored by rulers, cities and wealthy individuals, with special attention to the ongoing connections and cross-influences with athletic competitions. The organization is thematic rather than chronological, 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 claques, the adaptation of performance to political events, influence on art of stage and spectacle, Institutional and intellectual opposition to performance and spectacle. Evidence will include ancient treatises, inscriptions, mosaics, wall-paintings and terracottas; all source readings available in English (there will be an optional separate meeting for those wishing to read some texts in the original).

[CLASS 4625 The Christianization of the Roman World, 300 to 600 CE (also HIST 4831, RELST 4625) # (HA-AS)]
Christianization of the Roman world is concerned by the impact of Christianity on the late antique society and by the resistance and persistence of the old belief and practices.

[CLASS 4662 Topics in Ancient Philosophy (also PHIL 4200)]
Spring. 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 grad students will meet for two hours; grad students must stay for one additional hour. Next offered 2009–2010. B. Strauss.

[CLASS 4682 Topics in Ancient Greek History (also CLASS 7684, HIST 4320/6330)]

[CLASS 4683 Classics and Early America (also HIST 4861, GOVT 4862) # (HA-AS)]
Fall. 4 credits. H. Rawlings III.
The point of the seminar is to study several related questions: how deep was the Founders’ knowledge of the Classics (i.e., did it go beyond Plutarch and Livy?) How well did they know Latin and Greek? To what extent did these men actually use Greek and Roman texts in developing their political theories and ultimately the U.S. Constitution? How conscious were they of classical influences upon their thought? To what extent did they model their political aspirations and behavior upon the lives of leading Greeks and Romans? How did their views of actual Athenian democracy and the Roman Republic influence their political thinking? The format will be seminar discussion of mostly primary reading. Students will write one shorter paper on the reading, and a longer research paper on a major topic such as religious freedom, the structure of government, democratic vs. republican ideals, classical origins of federalism, etc. Grades will be determined by class participation as well as by the two papers.

[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 7633 Gender and Late Antiquity (also HIST/NEST/RELST 7633, FGSS 7630) ]
Fall. 4 credits. K. Bowes and K. Haines-Eitzen.
This seminar treats gender, broadly construed to include masculinity, feminity and sexuality—from approximately 100–500 AD. Of particular interest will be the multiple intersections between gender and late ancient economics, religion, politics, art and archaeology. The seminar will use relevant theoretical works and secondary sources to read ancient texts (hagiography, documentary papyri, ecclesiastical letters, inscriptions) and material culture (art, architecture and other artifactual material).

[CLASS 7667 Seminar in Ancient History: Spartacus (also HIST 6671) ]

[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. K. Clinton.
Continuation of GREEK 1101, prepares students for GREEK 1105.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Days</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GREEK 1103</td>
<td>Intensive Greek</td>
<td></td>
<td>6</td>
<td>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.</td>
</tr>
<tr>
<td>GREEK 1105</td>
<td>Elementary Ancient Greek III #</td>
<td>Fall</td>
<td>3</td>
<td>Prerequisites: GREEK 1102, 1103, or placement by departmental exam. K. Clinton. Introduces students to reading Greek literary texts (Xenophon's <em>Anabasis</em>) and a dialogue of Plato. Covers complex syntax and reviews the grammar presented in GREEK 1102 or 1103.</td>
</tr>
<tr>
<td>GREEK 1141</td>
<td>Elementary Modern Greek I (also NES 1340)</td>
<td>Fall</td>
<td>4</td>
<td>Credits. Next offered 2009–2010. 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.]</td>
</tr>
<tr>
<td>GREEK 1142</td>
<td>Elementary Modern Greek II (also NES 1341)</td>
<td>Spring</td>
<td>4</td>
<td>credits. Next offered 2009–2010. 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.]</td>
</tr>
<tr>
<td>GREEK 1143</td>
<td>Intermediate Modern Greek I (also NES 1342)</td>
<td>Fall</td>
<td>4</td>
<td>credits. Prerequisite: GREEK 1142/ NES 1341 or placement by departmental exam. Next offered 2009–2010. 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.]</td>
</tr>
<tr>
<td>GREEK 2104</td>
<td>Euripides: Alcestis # (LA-AS)</td>
<td>Spring</td>
<td>3</td>
<td>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 interface and weaves a most mysterious analysis of human responses to death, to marriage, 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.</td>
</tr>
<tr>
<td>GREEK 2144</td>
<td>Intermediate Modern Greek II (also NES 2324)</td>
<td>Spring</td>
<td>4</td>
<td>credits. Prerequisite: GREEK 1143/NES 1342 or placement by departmental exam. Next offered 2009–2010. 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.]</td>
</tr>
<tr>
<td>GREEK 3101</td>
<td>Greek Epic # (LA-AS)</td>
<td>Spring</td>
<td>4</td>
<td>credits. Satisfies Option 1. Prerequisite: one 2000-level Greek course. 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. The basic text we will follow is the Odyssey.</td>
</tr>
<tr>
<td>GREEK 3102</td>
<td>Greek Historiography and Oratory # (HA-AS)</td>
<td>Fall</td>
<td>4</td>
<td>credits. Satisfies Option 1. Prerequisite: one 2000-level Greek course. H. Pelliccia. Undergraduate seminar in Greek historiography and oratory. History and myth in Herodotus and Plato. Readings in Greek from Herodotus' Histories and Plato's Phaedrus, Critias, and Timaeus. Further readings in English from these and other ancient and modern authors.</td>
</tr>
<tr>
<td>GREEK 3185</td>
<td>Independent Study in Greek, Undergraduate Level</td>
<td>Fall and spring</td>
<td>4</td>
<td>credits. Prerequisite: permission of DUS in extraordinary circumstances only. Staff. Continuation of LATIN 1201, using readings from various authors; prepares students for LATIN 1205.</td>
</tr>
<tr>
<td>GREEK 4101</td>
<td>Advanced Readings in Greek Literature # (LA-AS)</td>
<td>Fall</td>
<td>4</td>
<td>credits. Prerequisite: one semester of 3000-level Greek. K. Clinton. Greek historiography. Text will include Aristotle's <em>Athenion Politeia</em> and selections from Xenophon.</td>
</tr>
<tr>
<td>GREEK 4102</td>
<td>Advanced Readings in Greek Literature # (LA-AS)</td>
<td>Spring</td>
<td>4</td>
<td>credits. Prerequisite: one semester of 3000-level Greek. C. Brittain. Texts will include Plato's <em>Protagoras, Symposium</em>, and parts of the Republic and <em>Timaeus</em>. The aim of the course is to improve reading speed and accuracy through the intense study of some of Plato's literary and stylistic masterpieces.</td>
</tr>
<tr>
<td>GREEK 7161</td>
<td>Greek Philosophical Texts (also PHIL 6010)</td>
<td>Fall and spring</td>
<td>4</td>
<td>credits. Prerequisites: knowledge of Greek and permission of instructor. T. Brennan. For description, see PHIL 6010.</td>
</tr>
<tr>
<td>GREEK 7171</td>
<td>Graduate Seminar in Greek</td>
<td>Fall</td>
<td>4</td>
<td>credits. P. Pucci. Topic: Homer: Narrative in the <em>Iliad</em>.</td>
</tr>
<tr>
<td>GREEK 7172</td>
<td>Graduate Seminar in Greek</td>
<td>Fall and spring</td>
<td>4</td>
<td>credits. Fall, R. Parker; spring, H. Pelliccia. Fall: Townsend Seminar on Greek Religion. This course will tackle major problems in Greek religion through special case studies; the aim will be to bridge the gap between big questions and theory on the one side, and close work with the actual documentary evidence for Greek religion (literary, inscriptive, iconographic) on the other. Spring: Pindar. Introduction to archaic Greek lyric poetry with a focus on Pindar. Study of the interpretation of Pindar's 7th Nemean ode will serve as an introduction to the history of scholarship on Greek lyric from Alexandrian times to the present; students will be called upon to read extensively in secondary works, both ancient and modern.</td>
</tr>
<tr>
<td>GREEK 7910</td>
<td>Independent Study in Greek</td>
<td>Fall and spring</td>
<td>1–4</td>
<td>credits.</td>
</tr>
<tr>
<td>LATIN 1201</td>
<td>Elementary Latin I</td>
<td>Fall</td>
<td>4</td>
<td>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, and oral drills.</td>
</tr>
<tr>
<td>LATIN 1202</td>
<td>Elementary Latin II</td>
<td>Spring</td>
<td>4</td>
<td>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.</td>
</tr>
<tr>
<td>LATIN 1203</td>
<td>Intensive Latin</td>
<td>Summer</td>
<td>6</td>
<td>credits. 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.</td>
</tr>
<tr>
<td>LATIN 1204</td>
<td>Latin in Review</td>
<td>Fall</td>
<td>4</td>
<td>credits. Students may not receive credit for both LATIN 1202 and LATIN 1204. Prerequisite: placement by departmental examination. A. Ruppel. 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.</td>
</tr>
<tr>
<td>LATIN 1206</td>
<td>Latin in Review</td>
<td>Fall</td>
<td>4</td>
<td>credits. Students may not receive credit for both LATIN 1202 and LATIN 1204. Prerequisite: placement by departmental examination. A. Ruppel. 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.</td>
</tr>
<tr>
<td>LATIN 1205</td>
<td>Elementary Latin III</td>
<td>Fall and spring</td>
<td>3</td>
<td>credits. Prerequisites: LATIN 1202, 1203, 1204 or placement by departmental exam. A. Ruppel. Introduces students to reading a literary Latin text (Ovid, <em>Ars Amatoria</em> I) Covers complex syntax and reviews the grammar presented in LATIN 1202, 1203, or 1204.</td>
</tr>
</tbody>
</table>
LATIN 2201 Latin Prose # (LA-AS)
Fall and spring. 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. Fall, C. Brittain and L. Van Abbema; spring, A. Nussbaum.
Fall: Reading of Cornelius Nepos' Life of Atticus. Nepos was a Roman biographer and historian as well as the man to whom Catullus dedicated his collection of poems. His biography of Atticus portrays this man of letters and friend of Cicero as a pivotal figure in the fall of the Roman Republic. Attention will be equally devoted to grammar and literary or historical context. Spring: Selections from Petronius' Satyricon and/or the Metamorphoses of Apuleius.

LATIN 2203 Catullus # (LA-AS)
Fall. 3 credits. Satisfies Option 1.
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' contemporaries are assigned in translation.

LATIN 2204 Roman Drama # (LA-AS)
Spring. 3 credits. Satisfies Option 1.
Topic: TBA.

LATIN 3201 Roman Epic # (LA-AS)
Spring. 3 credits. Satisfies Option 1.
Prerequisite: 2000-level Latin. F. Ahl.
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. L. Van Abbema.
Undergraduate seminar. Topic: Tacitus.

LATIN 3203 Roman Poetry (LA-AS)
Fall and spring. 3 credits. Satisfies Option 1.
Undergraduate seminar.

LATIN 3204 Roman Prose # (LA-AS)
Fall. 3 credits. Satisfies Option 1.
Undergraduate seminar.

LATIN 3215 Imperial Latin
Spring. 4 credits. Satisfies Option 1.
Undergraduate Latin seminar. Topic: TBA.

LATIN 3217 Latin Prose Composition # (LA-AS)
Fall. 4 credits. Prerequisite: one semester of 2000-level Latin. D. Mankin.

LATIN 3286 Independent Study in Latin, Undergraduate Level
Fall and spring. Variable to 3 credits. Prerequisite: permission of DUS in extraordinary circumstances only. Staff.

LATIN 4201 Advanced Readings in Latin Literature # (LA-AS)
Fall. 4 credits. Next offered 2009–2010. Staff.
Topic: TBA.

LATIN 4202 Advanced Readings in Latin Literature # (LA-AS)
Spring. 4 credits. Prerequisite: one term of 3000 level Latin. M. Fontaine.
Topic: Sallust. A rapid reading of Sallust's Catilina and Jugurtha in their entirety, along with fragments of the Histories and Appendix Sallustiana.

LATIN 4203 Survey of Latin Literature # (LA-AS)
Fall. 4 credits. Seniors must obtain permission from the instructor to enroll in the class. M. Fontaine.
Survey of Latin literature from the Roman republic to the Augustan period.

LATIN 4213 Survey of Medieval Latin Literature (also LATIN 7213, MEDVL 4103/6103) # (LA-AS)
Fall. 3 credits. 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 7213 Survey of Medieval Latin Literature (also MEDVL 4103/6103, LATIN 4213)
Fall. 3 credits. C. Ruff.
For description, see MEDVL 4103.

LATIN 7262 Latin Philosophical Texts (also PHIL/RELST 6020) # (KCM-AS)
Fall. 1–4 credits. Prerequisites: knowledge of Latin and permission of instructor. Staff.
For description, see PHIL 6020.

LATIN 7271 Graduate Seminar in Latin
Fall. 4 credits. Next offered 2009–2010. Staff.

LATIN 7272 Graduate Seminar in Latin
Spring. 4 credits. F. Ahl.
Topic: Seneca.

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)
Fall. 4 credits. Each student must enroll in a sec. A. Alexandridis.
For description, see ARTH 2200.

CLASS 2727 Art and Archaeology in the Ancient Mediterranean World (also ARKEO 2728, ARTH 2227) # (HA-AS)
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. A. Alexandridis.
What was it like to live in the Roman world? What did that world look, taste and smell like? How did Romans raise their families, entertain themselves, understand death, and interact with their government? This course takes as its subject the everyday lives of individuals and explores those lives using the combined tools of archaeology, art, as well as some primary source readings. Some of the topics explored will include the Roman house, urbanism, bathing and hygiene, entertainment, attitudes to sex and sexuality, self-display and emotion, religion, and death.

CLASS 3727 Iconography of Greek Myth (also ARTH 3320) # (HA-AS)
For description, see ARTH 3320.

CLASS 3730 Archaeology, Ethics, and Nationalism (also ARKEO 3730, HIST 3630) # (CA-AS)
This course explores the historical and ethical ramifications of doing archaeology. How has archaeology been used to bolster national identities and political movements? How are the current debates about cultural property, looting, and museum collections tied to issues of national identity? From the collecting practices of the popes, the archaeological projects of Nazi Germany to the current struggles between the Metropolitan Museum of Art and the Italian State, we’ll examine the role that archaeology has played and continues to play in politics and nationalism.

CLASS 3731 Archaeology/Ancient Mediterranean Religion (also ARKEO 3731) # (HA-AS)
Fall. 4 credits. Next offered 2009–2010. 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 3740 Arts of the Roman Empire (also ARTH 3320) # (HA-AS)
Fall. 4 credits. Staff.
For description, see ARTH 3320.

CLASS 3744 Hellenistic Culture (also ARTH 3224)
Fall. 4 credits. Next offered 2010–2011. A. Alexandridis.
For description, see ARTH 3224.

CLASS 3750 Introduction to Dendrochronology (also ARKEO 3909, ARTH 3325) # (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, fieldtrip(s) in local area. A possibility exists for summer fieldwork in the Mediterranean.
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. A. Nussbaum.

GREEK 4452 Latin Comparative Grammar (also LING 4452) (KCM-AS)

GREEK 4455 Greek Dialects (also LING 4455) (KCM-AS)

GREEK 4457 Homeric Philology (also LING 4457) (LA-AS)
Spring. 4 credits. Prerequisite: ability to read Homeric Greek. A. Nussbaum.

GREEK 4459 Mycenaean Greek (also LING 4459) (LA-AS)

LATIN 7492 Seminar in Latin and Italic Linguistics (also LING 7716)
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.
   \[
   \text{BIONB 3260 The Visual System} \quad \text{BIONB 4330/COGST 4310/PSYCH 5310 Consciousness and Free Will} \\
   \text{COGST 1101/CS 1710/LING 1170/PHIL 1910/PSYCH 1200 Introduction to Cognitive Science} \\
   \text{COGST/PSYCH 2140 Cognitive Psychology} \\
   \text{COGST/PSYCH 3420 Human Perception: Applications to Computer Graphics, Art, and Visual Display} \\
   \text{COGST/PSYCH 4160 Modeling Perception and Cognition} \\
   \text{COGST 4500/HD 4370/LING 4500/PSYCH 4570 Lab Course: Language Development} \\
   \text{COGST 4650/CS 3920/PSYCH 4650 Topics in High-Level Vision} \\
   \text{PSYCH 3050 Visual Perception} \\
   \text{PSYCH 3160 Auditory Perception} \\
   \text{PSYCH 4120 Laboratory in Cognition and Perception} \\
   \text{PSYCH 4180 Psychology of Music} \\
   \text{PSYCH 4190 Neural Networks Laboratory} \\
   \]

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.
   \[
   \text{COGST 1101/CS 1101/LING 1170/PHIL 1910/PSYCH 1200 Introduction to Cognitive Science} \\
   \text{COGST/PSYCH 2140 Cognitive Psychology} \\
   \text{COGST/LING/PSYCH 2150 Psychology of Language} \\
   \text{COGST/PSYCH 4160 Modeling Perception and Cognition} \\
   \text{COGST/PSYCH 4270 Evolution of Language} \\
   \text{COGST/LING/PSYCH 4280 Connectionist Psycholinguistics} \\
   \text{COGST 4340/HD 4240 Current Topics in Cognitive Development} \\
   \text{HD 4500/LING 4436/PSYCH 4360 Language Development} \\
   \text{COGST 4500/HD 4370/LING 4500/PSYCH 4570 Lab Course: Language Development} \\
   \text{CS 4110 Programming Languages and Logics} \\
   \text{LING 3301–3302 Introduction to Phonetics} \\
   \text{LING 3303 Introduction to Syntax} \\
   \text{LING 3304 Introduction to Semantics} \\
   \text{Pragmatics} \\
   \text{LING 4403 Syntax I, II} \\
   \text{LING 4421–4422 Semantics I and II} \\
   \text{PHIL 3520 Philosophy of Language} \\
   \text{PSYCH 4150 Concepts, Categories, and Word Meanings} \\
   \]

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.
   \[
   \text{COGST 1101/CS 1101/LING 1170/PHIL 1910/PSYCH 1200 Introduction to Cognitive Science} \\
   \text{COGST/PSYCH 2140 Cognitive Psychology} \\
   \text{COGST/PSYCH 4140 Comparative Cognition} \\
   \text{COGST/PSYCH 4160 Modeling Perception and Cognition} \\
   \text{COGST 2540/HD 3340 The Growth of the Mind} \\
   \text{COGST/HD 4320 Cognitive, Social, and Developmental Aspects of Scientific Reasoning} \\
   \text{COGST 4500/HD 4370/LING 4500/PSYCH 4570 Lab Course: Language Development} \\
   \text{CS 2110 Computers and Programming} \\
   \text{CS 4700 Foundations of Artificial Intelligence} \\
   \text{CS 4701 Practicum in Artificial Intelligence} \\
   \text{PSYCH 4120 Laboratory in Cognition and Perception} \\
   \text{PSYCH 4130 Information Processing: Conscious and Nonconscious} \\
   \text{PSYCH 4150 Concepts, Categories, and Word Meanings} \\
   \text{PSYCH 4170 The Origins of Thought and Knowledge} \\
   \]

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.
   \[
   \text{COGST 1101/CS 1101/LING 1170/PHIL 1910/PSYCH 1200 Introduction to Cognitive Science} \\
   \text{COGST/PSYCH 2140 Cognitive Psychology} \\
   \text{COGST/HD 2200 The Human Brain and Mind} \\
   \text{COGST/BIONB/PSYCH 3500 Introduction to Computational Neuroscience} \\
   \text{COGST/PSYCH 4160 Modeling Perception and Cognition} \\
   \text{PSYCH 3320/BIONB 3280 Biopsychology of Learning and Memory} \\
   \text{PSYCH/BIONB 3960 Introduction to Sensory Systems} \\
   \text{PSYCH 4250 Cognitive Neuroscience} \\
   \]

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.
   \[
   \text{COGST 4700 Undergraduate Research in Cognitive Studies} \\
   \text{COGST 4710 Cognitive Studies Research Workshop} \\
   \]

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 required that students report 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, 255–5645, 4144 Upson Hall, selman@cs.cornell.edu; Draga Zec, linguistics, 255–0728, 217 Morrill Hall, dzi17@cornell.edu; Morten Christens, psychology, 255–3750, 2380 Uris Hall, mch27@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 presequence course COGST 6501 Introduction to Cognitive Science [not offered 2008-2009] 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 Christens (255–3750, mch27@cornell.edu).

### Courses

#### Cognitive Science

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COGST 1110</td>
<td>Introduction to Cognitive Science (also LING 1170, PHIL 1910, PSYCH 1102) (KCM-AS)</td>
<td>Fall, 3 or 4 credits</td>
<td>4-credit option involves writing section instead of exams.</td>
<td>B. Bienvenue.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COGST 1110</td>
<td>Brain, Mind, and Behavior (also BIONB/PSYCH 1110) (PBS)</td>
<td>Spring, 3 credits</td>
<td>M. Christiansen.</td>
<td>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. Next offered 2009–2010. R. Hoy and E. Adkins Regan.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>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?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COGST 1500</td>
<td>Intro to Human Environment Relations (also DEA 1500)</td>
<td>Spring, 3 credits</td>
<td>G. Evans.</td>
<td>For description, see DEA 1500.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COGST 2140</td>
<td>Cognitive Psychology (also PSYCH 2140/6140) (KCM-AS)</td>
<td>Fall, 4 credits</td>
<td>M. Rooth.</td>
<td>Sophomore standing. Note: Undergraduates who want 5 credits also should enroll in COGST 6140. S. Edelman.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COGST 2150</td>
<td>Psychology of Language (also LING/PSYCH 2150) (KCM-AS)</td>
<td>Spring, 3 credits</td>
<td>M. Christiansen.</td>
<td>Sophomore, junior, or senior standing; any one course in psychology or human development.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>For description, see PSYCH 2150.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COGST 2300</td>
<td>Cognitive Development (also HD 2300)</td>
<td>Spring, 3 credits</td>
<td>Q. Wang.</td>
<td>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 &quot;real&quot; kids.</td>
</tr>
</tbody>
</table>

#### COGNI'TIVE SCIEnCE prOGraM 509

**COGST 2380 Thinking and Reasoning**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COGST 2380</td>
<td>Thinking and Reasoning (also HD 2380)</td>
<td>Fall, 3 credits</td>
<td>B. Koslowski.</td>
<td>HD 1150 or PSYCH 1101. B. Koslowski.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Examines problem solving and transfer, preconceived 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 problems and issues 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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COGST 3300</td>
<td>Introduction to Computational Neuroscience (also BIONB 2330/PSYCH 3300) (PBS)</td>
<td>Fall, 3 credits</td>
<td>C. Linster.</td>
<td>4-credit option includes lab providing additional computer simulation exercises. Limited to 25 students.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Covers the basic ideas and techniques involved in computational neuroscience. Surveys diverse topics including: neural dynamics of small networks of cells, neural coding, learning in neural networks and in brain structures, memory models of the hippocampus, sensory coding, and others.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COGST 3330</td>
<td>Problems in Semantics—Quantification in Natural Language (also LING 3333, PHIL 3330) (KCM-AS)</td>
<td>Spring, 4 credits</td>
<td>C. Linster.</td>
<td>Course in logic or semantics or permission of instructor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Looks at problems in the semantic analysis of natural languages, critically examining work in linguistics and philosophy on particular topics of current interest.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COGST 3340</td>
<td>The Growth of the Mind (also HD 3340) (KCM-AS)</td>
<td>Spring, 4 credits</td>
<td>B. Lust.</td>
<td>Course in human experimental psychology, cognitive psychology, statistics, HD 1150, or equivalent, or permission of instructor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Primarily intended for sophomores through seniors.</td>
</tr>
</tbody>
</table>
| | | | | 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**
(see 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 6390 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 457/LING 4500/PSYCH 437).

**COGST 3420  Human Perception: Applications to Computer Graphics, Art, and Visual Display**
(see also PSYCH 3420/6420, VISST 3342)
Fall. 4 credits. Required: PSYCH 3420/LING 4424.
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)
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.

**COGST 4140  Comparative Cognition**
(also PSYCH 4140/7140) (KCM-AS)
Spring. 3 or 4 credits; 4-credit option involves annotated bibliography or creating relevant web site. Prerequisites: PSYCH 2050, 2090, 2140, 2250, 2020, or permission of instructor. Staff.
Examines some of the conceptual and empirical work resulting from and fueling the recent surge of interest in animals’ thinking. Specific topics may include whether nonhumans behave intentionally; whether they show concept and category learning, memory, and abstract thinking similar to that of humans; the role of social cognition in the evolution of intelligence; and whether animals are conscious or self-aware. Evidence from communication studies in which animal signals provide a “window on the mind” plays a strong role in the deliberations, including studies of naturally occurring signaling in various species and experiments in which nonhumans are trained in human-like language behavior. Cognition in nonhuman primates is a special focus throughout. The course is a mix of lecture and discussion, emphasizing the latter as much as possible.

**COGST 4160  Modeling Perception and Cognition**
(also PSYCH 4160/6160)
Spring. 4 credits. Prerequisites: PSYCH 2050, 2090, 2140, or 2150, or permission of instructor. Next offered 2009–2010. Staff.
For description, see PSYCH 4160.

**COGST 4240  Computational Linguistics**
(also CS 3470, LING 4424) (MGR)
Fall. 4 credits. Recommended: CS 2006. Labs involve work in Unix environment.
M. Rooth.
For description, see LING 4424.

**COGST 4260  Learning Language**
(also PSYCH 4260/7260)
Spring. 4 credits. Limited to 20 students.
Prerequisite: PSYCH 2140 or by permission of the instructor. Next offered 2009–2010. 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; next offered 2009–2010. 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. M. Christiansen.
Connectionist psycholinguistics involves using (artificial) “neural” networks, which are inspired by brain architecture, to model empirical data on the acquisition and processing of language. As such, connectionist psycholinguistics has had a far-reaching impact on language research. This course surveys the state of the art of connectionist psycholinguistics, ranging from speech processing and word recognition, to inflectional morphology, sentence processing, language production, and reading. An important focus of discussion is the methodological and theoretical issues related to computational modeling of psychological data. The broader implications of connectionist models of language are discussed, not only for psycholinguistics, but also for computational and linguistic perspectives on language.

**COGST 4310  Consciousness and Free Will**
(also BIONB 4330, PSYCH 5310)
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; next offered 2009–2010. 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. Next offered 2009–2010 E. Temple.
For description, see HD 4330.

**COGST 4340  Current Topics in Cognitive Development**
(also HD 4240) (KCM-AS)
Fall. 3 credits. Corequisite: COGST/HD 2340; permission of instructor. Offered alternate years; next offered 2009–2010. The course will supplement survey course HD/COGST 3540 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 3540 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. Letters grades only. Next offered 2009–2010 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. B. Lust.
Optional supplement to the survey course Language Development (also HD/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 (also PSYCH 4650/6650)

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 2210, 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 seven 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.
Intensive examination of the basic research methods used in social, personality, cognitive, and developmental psychology. The course 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. Beyond learning methods of "correct" and rigorous experimentation, we also discuss what makes a research study actually interesting. 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.

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 4110 Programming Languages and Logics
Fall. 4 credits. Next offered 2009–2010.]

COGST 4700 Foundations of Artificial Intelligence
Fall. 3 credits. T. Joachims.

COGST 4701 Practicum in Artificial Intelligence
Fall. 2 credits. T. Joachims.

COGST 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 2009–2010. E. Temple.]

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. Next offered 2009–2010. B. Koslowski.]

[HD 3360 Connecting Social, Cognitive, and Emotional Development
Fall. 3 credits. Next offered 2009–2010. M. Casasola.]

HD 3370 Language Development (also COGST/PSYCH 3370, LING 4436)
Spring. 4 credits. B. Last.

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 3570, COGST/LING/PSYCH 456. 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 1020)
Fall. 3 credits. Offered alternate years.

LING 2215  Psychology of Language (also COGST 2150, LING 7715, PSYCH 2150/7150)
Spring. 3 credits. M. Christiansen.

LING 3322  Philosophy of Language (also PHIL 3320)
Fall. 4 credits. Staff.

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. 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 456. B. Lust.

Mathematics

[MATH 2810] Deductive Logic (also PHIL 3310)
Fall. 4 credits. Offered alternate years.

[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)

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 1110] Brain, Mind, and Behavior (also BIONB 1111, COGST 1110)

PSYCH 1200  Introduction to Cognitive Science (also COGST/CS 1101, LING 1170, PHIL 1910)
Fall. 3 or 4 credits. Staff.

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)
Fall. 3 credits. S. Edelman.

PSYCH 2150  Psychology of Language (also COGST 2150, LING 2215/715, 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)

[PSYCH 3960] Introduction to Sensory Systems (also BIONB 3960, PSYCH 6960)
Spring. 3 or 4 credits. Next offered 2009–2010. B. Halpern.

PSYCH 4120  Laboratory in Cognition and Perception (also PSYCH 6121)
Spring. 4 credits. D. Field.

[PSYCH 4140] Comparative Cognition (also COGST 4140, PSYCH 7140)
Spring. 3 or 4 credits. Next offered 2009–2010.

[PSYCH 4160] Modeling Perception and Cognition (also COGST 4160, PSYCH 6160)

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. B. Finlay.

[PSYCH 4270] Evolution of Language (also COGST 4270, PSYCH 6270)
Fall. 3 credits. Offered alternate years; next offered 2009–2010. M. Christiansen.

PSYCH 4280  Connectionist Psycholinguistics (also COGST 4280, LING 4428/6628, PSYCH 6280)
Fall. 3 credits. Offered alternate years. M. Christiansen.

PSYCH 4310  Effects of Aging on Sensory and Perceptual Systems (also BIONB 4310, 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 4500. B. Lust.

PSYCH 4650 Topics in High-Level Vision (also COGST 4650, CS 392, PSYCH 6655)  
Spring. 4 credits. Offered alternate years. S. Edelman.

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. 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 2009–2010. S. Edelman.

Concentrates on the nature of the representation of visual objects and scenes in the brain and compares it with the structural framework that serves as the main explanatory tool in current theories of language processing. Data and ideas are drawn from visual psychophysics, neurophysiology, psycholinguistics, computational vision and linguistics, and philosophy. Students present published research papers and preprints, which are then discussed and critiqued.

[COGST 5500] Special Topics in Cognitive Science  
Fall. 4 credits. Next offered 2009–2010. Staff.

COGST 6140 Cognitive Psychology (also PSYCH 6140)  
Fall. 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 used to follow the current thought on the nature of mind and its relationship to the brain.

[COGST 6300] Structure in Vision and Language (also PSYCH 6301)  

COGST 6330 Language Acquisition (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 2009–2010. Staff.

COGST 6501 surveys the study of how the mind/brain works and draws primarily from five disciplines that make major contributions to cognitive science: philosophy, psychology, neuroscience, linguistics, and computer science. Graduate students enrolled in this course will observe the Tuesday/Thursday lectures for COGST 1101 and also attend a weekly discussion section with the professor.

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 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 3570 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. B. 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.

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 5530] Representation of Structure in Vision and Language (also COGST/PSYCH 6300)  
Spring. 4 credits. Offered alternate years; next offered 2009–2010. S. Edelman.

[LING 6609] Second Language Acquisition and the Asian Languages (also ASIAN 6610)  

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 6620 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 2009–2010.]
COLLEGE SCHOLAR PROGRAM

K. Galbraith, 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

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 and 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 2008–2009, COML 4580 [fall], COML 4860 [spring]). If elected, an honors essay will also count as one of these required five courses.

If an honors essay (COML 4990 [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. Two 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 studies at the 2000 or higher level offered by the Department of Comparative Literature or other humanities departments or programs.
2. Two 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 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 2000) (LA-AS)**
Spring. 4 credits. M. Fernandez.
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 2009–2010. Staff.

**COML 2020 Global Books (LA-AS)**
Spring. 4 credits. A. Barjee
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 Kerauc, we will explore how literary adventures structure our experience of the world.

**COML 2030 Introduction to Comparative Literature (LA-AS)**
Fall. 4 credits. 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 Comparativists 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. ext offered 2009–2010.
N. Melas.

**[COML 2050 Introduction to Poetry (LA-AS)]**
Fall. 4 credits. Next offered 2009–2010.
W. J. Kennedy.

**COML 2150 Comparative American Literatures (also AMST 2150) (LA-AS)**
Fall. 4 credits. Limited to 15 students.
B. Maxwell.
Twentieth-century writing from Canada, the United States, the Caribbean, and Latin America. A hemispheric American Studies perspective will encourage thinking about and across cultural, linguistic, and national demarcations. This course proposes taking seriously words from Africa, passed on by the novelist Paule Marshall: “Once a great wrong has been done, it never dies. People speak the words of peace, but their hearts do not forgive. Generations perform ceremonies of reconciliation but there is no end.”

Countering the literature of amnesia and baseless optimism, the works that we will read cannot forget, and decline to forgive, the historical traumas that so bitterly flavor them. Our concern largely will be with understanding the aesthetic strategies and innovations that these writers use to perform ceremonies not bent on reconciliation.

**[COML 2200 Thinking Surrealisms (also ARTH 2019, VISST 2190) (LA-AS)]**
B. Maxwell.

**COML 2331 French Thought After May '68 (also GOVT 2626, HIST 2331) (LA-AS)**
Spring. 4 credits. Limited to 15 students.
C. Robics.
For description, see HIST 2331.

**COML 2410 Literature and Ethics**
Spring. 4 credits. A. Weiner.

What is the relationship between literature and ethics? This course will attempt to respond to this question by exploring texts from different periods and genres. We will consider the ethics of othersness, of violence, of mourning, of the potential and dangers of human creation, and of both the commitment and refusal to act in the political sphere. We will ask what the ethics of writing itself may be, of what the implications of creating and reading narratives are, and if these acts can—or should—be the same as the enactment of ethical behavior and awareness in everyday life. Readings from Plato, Sophocles, Rousseau, Mary Shelley, Baudelaire, Dostoevsky, Celan, Morrison, and Coetzee will be supplemented with philosophical texts from Montaigne, Kant, Levinas, Derrida, and Butler.

**COML 3320 Parranoia and Conspiracy (also CLASS 2632) (LA-AS)**
Spring. 4 credits. M. Fontaine.
For description, see CLASS 2632.

**COML 3020 Literature and Theory (also ENGL 3020) (LA-AS)**
Fall. 4 credits. 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 2009–2010.
N. Melas.

**[COML 3060 Comparative Martial Arts Film and Literature (LA-AS)]**
Fall. 4 credits. Next offered 2009–2010.
P. Liu.

**COML 3170 Postcolonial State Theory (CA-AS)**
P. Liu.

**COML 3260 Christianity and Judaism (also RELST 3260) (LA-AS)**
Spring. 4 credits. C. Carmichael.

**[COML 3240 Literature of the Old Testament (also RELST 3280) # (LA-AS)]**
Fall. 4 credits. Next offered 2009–2010.
C. M. Carmichael.

**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 on Shakespeare’s plays in relation to Italian comedy, early French tragedy, and plays by Friedrich Schiller, Bertolt Brecht, and Luigi Pirandello.

**COML 3500 Education and Philosophical Fantasies (also RUSSL 3350) (LA-AS)**
Fall. 4 credits. P. Carden.
For description, see RUSSL 3500.

**[COML 3620 The Culture of the Renaissance II (also ARTH 3420, ENGLISH 3250, FREN 3620, HIST 3640, RELST 3242) (LA-AS)]**
W. J. Kennedy.

**COML 3630 The European Novel # (LA-AS)**
Fall. 4 credits. Next offered 2009–2010.
N. Saccamano.

**COML 3640 The European Novel # (LA-AS)**
Staff.

**COML 3650 Contemporary Fiction # (LA-AS)**
Spring. 4 credits. B. Maxwell.
A study of writing from the first half of the 20th century, this course aims to acquaint students with certain key texts of European modernism. We will attend particularly to the making of literary types and characters, to traces of utopian and messianic elements; to the relations between memory and political revolution; and to the motive of ressentiment. Authors whose work (in translation) we will study include Robert Walser, Franz Kafka, Bertolt Brecht, Alfred Doblin, Christa Wolf, Louis-Ferdinand Céline, Elio Vittorini, W. G. Sebald, Natalia Ginzburg, and Isaac Babel. Collaborative theoretical readings by Brecht, Wolf, Georg Lukács, Ernst Bloch, Walter Benjamin, Siegfried Kracauer, Gershom Scholem, and Elias Canetti. We will view two recent films: István Szabó’s Mephisto and Institute Benjamenta by the Brothers Quay.

**COML 3702 Desire and Cinema (also ENGL 3702) (LA-AS)**
Spring. 4 credits. E. Hanson.
For description, see ENGL 3702.

**COML 3716 Education of Princes: Medieval Advice Literature of Rulership/Counsel (also GOVT/NEST 3716) (LA-AS)**
Fall. 4 credits. S. Toorawa.
For description, see NES 3716.

**[COML 3730 Literature of the Outlaw # (LA-AS)]**
Fall. 4 credits. Next offered 2009–2010.
B. Maxwell.

**COML 3800 Poetry and Poetics of Americas (also AMST 3820, LATA 3800, 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, Marti, Stein, Dario, Williams, Mistral, Pound, Paz, Olson, Burgaes, Rich, Cézair, Walcott, Glissant, Oppen, Brathwaite, Parra, Ashbery, Zuri, 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 3820** Greeks, Romans, and Victorians (also CLASS 3642) # (LA-AS)
Spring. 4 credits. F. Ahl.
For description, see CLASS 3642.

**COML 3860** Literature and Film of South Asia (also ASIAN 3387, VISS 3870) # (CA-AS)
Spring. 4 credits. A. Banerjee.
A survey of literary and filmic texts from the area encompassing present-day India, Pakistan, and Bangladesh. Discussions are organized around issues such as nation and narrative; historiography; secularism and religious nationalism; gender; marginalized and diasporic identities. All texts are in English translation/ subtitles. Though focused on the twentieth century, the course will engage epic and folkloric discourses in context. Authors to be studied range from canonical figures of Rabindranath Tagore, M. K. Gandhi, Ismat Chughtai, and Sadat Hasan Manto to contemporary literary pioneers such as Mahasweta Devi, Kishwar Naheed, K. R. Ananthamurthy, and Taslima Nasreen. Films include auteur and independent cinema, Bombay potboilers, and documentaries.

**COML 4000** Forms of the Novel (LA-AS)

**COML 4050** Theory of the Theatre and Drama (also GERST/THETR 4310)
Fall. 4 credits. H. Yan.
For description, see THETR 4310.

**COML 4080** Martial Arts Film and Literature: Globalization from the East (also ASIAN 4452, FILM 4080)
Mandatory weekly film viewings to be held on Wednesdays.

**COML 4090** Spinoza and New Spinozism (also GERST 4090, GOVT 4769) (LA-AS)
Fall. 4 credits. Vicente. W. Haile. For description, see GERST 4090.

**COML 4100** Science, Technology, and Culture (also STS 4101) (CA-AS)

**COML 4150** The Theory and Analysis of Narrative (LA-AS)

**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.

**COML 4220** Literature and Oblivion (LA-AS)

**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)

**COML 4290** Postcolonial Poetry and the Poetics of Relation (also COML 6350, ENGL 4340, FREN/SPAN 4350)
Fall. 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 “poets of poetry” within U.S. (and) academic contexts(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 4320** Time and the Other

**COML 4321** Telling Fictions (also ENGL 4321)
Spring. 4 credits. C. Chase.
For description, see ENGL 4321.

**COML 4380** Arendt, Morisaki, Weil (also ASIAN 4468/6668, COML 6240) (KCM-AS)
Fall. 4 credits. Limited to 20 students. B. deBary.

**COML 4430** Partitioned Postmodernity and Anomalous Colonies in East Asia (also ASIAN 4465)
Fall. 4 credits. Limited to 15 students. P. Liu.
This course is concerned with the Cold War in East Asia—the “partitioning” of China, Japan, and Korea into mutually hostile, geographically fractured and temporarily desynchronized “zones” in the post-WWII era—and how this historical experience produced a postmodern aesthetics in East Asia. We will be interested in recent research projects on Taiwan, Hong Kong, South Korea and Japan as informal colonies of the United States and on the “East Asian economic miracle” as an exception to capitalist development. Literary works will complement our theoretical discussions.

**COML 4500** Renaissance Poetry (also ENGL 6500, ENGL 6220, ITALL 4500/6500) # (LA-AS)
Fall. 4 credits. W. J. Kennedy.
A reading and discussion of key texts in lyric poetry from Italian, French, English, and other European literatures of the Renaissance. Topic for Fall 2008: Economic transactions and exchanges in the poetry of Petrarch, Michelangelo, Labe, Ronsard, Shakespeare, Mary Wroth, and others.

**COML 4520** Renaissance Humanism (also COML 6520) # (LA-AS)

**COML 4580** Narratives of Travel, Migration, and Identity (also STS 4101) (CA-AS)
Fall. 4 credits. Limited to 15 students. Core course for COML majors. A. Banerjee.
The course explores the relationship between space, place, and subjectivity through texts whose motivation and premise explicitly involve dislocation rather than replacement. Readings are drawn from multiple contexts and periods, with emphasis on those that question established cartographic notions of east and west, north and south. These texts, individually and in a comparative framework, will provide opportunities for critiquing not only spatial concepts such as home and the world, inclusion and exclusion, center and periphery, but also temporal labels such as pre-, early-, post-colonial, -modern, or -national. Discussions will be framed by theoretical readings from Foucault, Said, Anderson, Pratt, and Bhabha among others.

**COML 4700** Translation and Cultural Difference (also ASIAN 4481) # (KCM-AS)
For description, see ASIAN 4481.
COML 4740  Topics in Modern European Intellectual and Cultural History (also HIST 4740, JST 4740/6740) Fall. 4 credits. Prerequisite: permission of instructor. D. LaCapra.
Topic: History and the Human Animal. For description, see HIST 4740.

COML 4741  Topics in Modern European Intellectual and Cultural History (also HIST 4741) Spring. 4 credits. D. LaCapra. For description, see HIST 4740.


COML 4830  Imagining the Holocaust (also ENGL/JST 4580, GERST 4570) (LA-AS) Fall. 4 credits. D. Schwarz. For description, see ENGL 4580.

COML 4860  Contemporary Poetry and Poetics (also ENGL 4890, SPAN 4880) (LA-AS) Fall. 4 credits. Limited to 15 students. Core course for COML majors. 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 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  Power Technology, Empire, and Modernity (also COML 6900) Fall. 4 credits. Limited to 15 students. A. Banerjee. No technology is more freighted with the dual association of empire and modernity than those which harness and generate power. The course focuses on three transformative power technologies: steam, electricity, and nuclear power. Each came to represent rationality, development, mobility, and nation-building on the one hand and territorial conquest, military expenditure, economic expansion, and governance of subject populations on the other. This is precisely what the course aims to juxtapose literary, visual, philosophical, and social scientific treatments of power technology from the west/ north with those from colonial and postcolonial perspectives. The objective is to generate a critical vocabulary for the ways in which power technologies have influenced discourses of modernity as well as empire over the last two centuries, culminating in our present moment of globalization when they can no longer be considered solely in the context of the modern, industrialized world.

COML 4923  Renaissance Venice, Queen of Seas (also SHUM 4923) Spring. 4 credits. W. J. Kennedy. For description, see SHUM 4923.

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 A 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 JST/WEST/NE 4730) @ (LA-AS) Spring. 4 credits. G. Holst-Warhaft. For description, see NES 4738.

COML 6020  Literature and Theory (also ENGL 6020) Fall. 4 credits. J. Culler. For description, see ENGL 6020.

COML 6051  Theatre of the Theatre and Drama (also THETR 4310/6310) Fall. 4 credits. H. Yan. For description, see THETR 6310.

[COML 6090  Comparison and Cultural Difference Fall. 4 credits. Next offered 2009–2010. N. Melas.] 

COML 6141  The Man Without Qualities Fall. 4 credits. P. McBride. For description, see GERST 6140.

COML 6160  Translation, In Theory (also ASIAN 6619, VISST 6190) Spring. 4 credits. Next offered 2009–2010. B. deBary.

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 6240  Arendt, Morisaki, Weil (also ASIAN 4468/6668, COML 4380) Fall. 4 credits. Next offered 2009–2010. B. deBary.

COML 6300  Aesthetics in the 18th Century (also ENGL 6300) Fall. 4 credits. N. Saccamano. For description, see ENGL 6300.


COML 6350  Postcolonial Poetry and the Poetics of Relation (also COML 4290, ENGL 4840, FREN/SPAN 6350) Fall. 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 2009–2010. N. Melas.]
COML 6791 Acoustic Horizons: Aesthetics and Politics of Sound in Theory, Film, and New Media (also ENGL 6791)
Spring. 4 credits. T. Murray.
For description, see ENGL 6791.


[COML 6880 Wordsworth and Rousseau (also ENGL 7410) Spring. 4 credits. Next offered 2009–2010. C. Chase.]

[COML 6890 Adorno's Aesthetic Theory (also GERST 6890) Fall. 4 credits. Next offered 2009–2010. P. Hohenhald.]

COML 6900 Power Technology, Empire, and Modernity (also COML 6900) Fall. 4 credits. A. Banerjee.
For description, see COML 4900.

[COML 6920 Digital Bodies, Virtual Identities (also ENGL 6960, THETR 6330) Fall. 4 credits. Next offered 2009–2010. T. Murray.]

COML 6960 Rites of Contact (also GERST/NE 6960) Spring. 4 credits. L. Adelson.
For description, see GERST 6960.

[COML 6970 Cosmopolitanism (also ENGL 6970) Spring. 4 credits. Next offered 2009–2010. N. Saccamano.]

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. For details, visit our web site at www.cs.cornell.edu/ugrad.

The Major
CS majors take courses in algorithms, data structures, logic, programming languages, scientific computing, systems, and theory. Electives in artificial intelligence, computer graphics, computer vision, databases, multimedia, and networks are also possible.

Requirements include:
- three semesters of calculus (MATH 1110–1220 or (1120)–2210 or 1910–1920–2940)
- two semesters of introductory computer programming (CS 1110 or 1112 and 1130, and 2110)
- a 1-credit project (CS 2111)
- a seven-course Computer Science core (CS 2800, 3110, 3410 or 3420; one of 3220, 4210, or 4220; 3810, 4410, and 4820)
- two 4000+ Computer Science electives (CS 4999 not allowed)
- a Computer Science project course (CS 4121, 4321, 4411, 4450, 4621, 4701, 5150, 5410, or 6670)
- a mathematical elective course (e.g., ENGRD 2700, MATH 2220 or 2930, MATH 3000+, TAM 3100)
- two 3000+ courses that are technical in nature
- a three-course specialization in a topical area other than Computer Science. These courses must be numbered 3000 level or greater.

Note: All of the field electives described above must be courses of 3 or more credit hours with the exception of the CS project course, which is 2 credits or more.

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, 2111, and 2800.
- a GPA of 2.5 or better in MATH 1120, 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 semesters.
- 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 4150+ elective requirement, the CS project requirement, the math elective, the technical electives, or the specialization. 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. 513(6).

Courses
For complete course descriptions, see “Computer Science” under “Computing and Information Science (CIS).”

CS 1109 Fundamental Programming Concepts
Summer. 2 credits. Prerequisite: none. S–U grades only.

CS 1110, 1112 Introduction to Computer Programming (MGR)
Fall. spring. 4 credits. Students may not receive credit for CS 1110, 1112, 1113, 1114 and 1150.
CS 1113, 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 1301 Introduction to Programming Web Applications
Fall. Weeks 1–7. 2 credits. Students must enroll in both CS 1301 and 1302.

CS 1302 Introduction to Designing Web Applications
Fall. Weeks 8–14. 2 credits. Students must enroll in both CS 1301 and 1302.
Prerequisite: CS 1301 or equivalent knowledge.

CS 1610 Computing in the Arts (also CIS/ENGR 1610, DANCE 1540, FILM 1750, MUSIC 1465, PSYCH 1650)
Spring. 3 credits. Recommended: good comfort level with computers and some of the arts.

CS 1620 Visual Imaging in the Electronic Age (also ARCH 4509, 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 1200) (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 1112 or CS 1115 if completed before fall 2007 or equivalent course in Java or C++.

CS 2111 Programming Practicum  
Fall, spring. 1 credit. Pre- or corequisite: CS/ENGRD 2110. Letter grades only.

CS 2300 Intermediate Design and Programming for the Web (also INFO 2300)  
Spring. 3 credits. Prerequisite: CS 1301 and 1302 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: one programming course and MATH 2210 or 2940; knowledge of discrete probability and random variables at the level of CS 2800.

CS 3300 Data-Driven Web Applications (also INFO 3300)  
Spring. 3 credits. Prerequisite: CS/ENGRD 2110. CS majors may use only one of the following toward their degree: CS/INFO 3300 or CS 4321.

CS 3410 Systems Programming  
Fall. 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 2900. Should not be taken concurrently with CS 3110.

CS 3700 Explorations in Artificial Intelligence (also INFO 3720)  
Spring. 3 credits. Prerequisites: MATH 1110 or equivalent, a statistics course, and CS/ENGRD 2110 or permission of instructor. Next offered 2009–2010.

CS 3740 Computational Linguistics (also COGST 4240, LING 4424) (MQR-AS)  
Fall or spring. 3 credits. Recommended: CS 2042.

CS 3810 Introduction to Theory of Computing  
Fall, summer. 3 credits. Prerequisite: CS 2800 or permission of instructor.

CS 4110 Programming Languages and Logics  
Fall. 4 credits. Prerequisite: CS 3110 or permission of instructor. Next offered 2009–2010.

CS 4120 Introduction to Compilers  
Spring. 3 credits. Prerequisites: CS 3110 or permission of instructor and CS 3410 or 3420. Corequisite: CS 4121.

CS 4121 Practicum in Compilers  
Spring. 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)  
Fall. 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  
Spring. 3 credits. Prerequisite: CS 3410 or 3420.

CS 4411 Practicum in Operating Systems  
Fall, spring. 2 credits. Corequisite: CS 4410.

CS 4420 Computer Architecture (also ECE 4750)  
Fall. 4 credits. Prerequisites: ENGRD 2300 and CS 3420/ECE 3140.

CS 4450 Computer Networks  
Spring. 4 credits. Pre- or corequisite: CS 4410 or permission of instructor.

CS 4520 Introduction to Bioinformatics  
Spring. 4 credits. Prerequisites: CS/ENGRD 2110, CS 2800.

CS 4620 Introduction to Computer Graphics (also ARCH 3704)  
Fall. 3 credits. Prerequisite: CS/ENGRD 2110.

CS 4621 Computer Graphics Practicum  
Spring. 2 credits. Pre- or corequisite: CS 4620.

CS 4700 Foundations of Artificial Intelligence  
Fall. 5 credits. Prerequisites: CS 2110 and 2800 (or equivalent).

CS 4701 Practicum in Artificial Intelligence  
Fall. 2 credits. Pre- or corequisite: CS 4700.

CS 4702 Artificial Intelligence: Uncertainty and Multi-Agent Systems  
Spring. 4 credits. Prerequisites: CS/ENGRD 2110 and CS 2800 or equivalent.

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. Next offered 2009–2010.

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).

CS 4812 Quantum Computation (also PHYS 4481/7681)  
Spring, summer. 4 credits. Prerequisite: familiarity with theory of vector spaces over complex numbers. Not offered every year; next offered 2009–2010. 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), CS 3810 (or mathematical maturity), or permission of instructor.

CS 4850 Mathematical Foundations for the Information Age  
Spring. 4 credits. Prerequisite: CS 3810.

CS 4860 Applied Logic (also MATH 4860) (MQR)  
Fall or spring. 4 credits. Prerequisites: MATH 2210 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  
Spring. 4 credits. Prerequisite: CS 2110 or equivalent experience programming in Java or C++.
CS 5300 The Architecture of Large-Scale Information Systems (also INFO 5300)
Spring. 4 credits. Prerequisite: CS/INFO 3500 or CS 4320.

CS 5410 Intermediate Computer Systems
Fall or spring. 4 credits. Prerequisite: CS 4410 or permission of instructor. Next offered fall 2008.

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 2009.

CS 5450 Advanced Computer Networks
Fall or spring. 4 credits. Prerequisites: CS 4450 or permission of instructor. Next offered fall 2008.

CS 5620 Interactive Computer Graphics

CS 5640 Computer Animation (also ART 2703, CIS 5640)
Fall. 4 credits. Prerequisite: none. Next offered 2009–2010.

CS 5642 Advanced Animation (also ART 3702, CIS 5642)

CS 5643 Physically Based Animation for Computer Graphics
Spring. 4 credits. Prerequisites: CS/ENGRD 3220 and/or CS 4620 or permission of instructor. Offered alternate years.

CS 5722 Heuristic Methods for Optimization (also CEE 5290, ORIE 5290)
Fall or spring. 3 or 4 credits. Prerequisites: CS/ENGRD 3120 or CS/EGRD 3200, or graduate standing, or permission of instructor. Next offered 2009–2010.

CS 5780 Empirical Methods in Machine Learning and Data Mining
Fall or spring. 4 credits. Prerequisites: CS 2800 and/or CS 4320 or equivalent. Next offered 2009–2010.

CS 5846 Decision Theory I (also ECON 4760/6760)
Fall. 4 credits. Prerequisite: mathematical sophistication.

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; next offered 2009–2010.

CS 6220 Sparse Matrix Computations
Fall. 4 credits. Prerequisite: CS 6210. 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 2008.

CS 6450 Research in Computer Networks
Fall or spring. 4 credits. Prerequisites: CS 4450 or permission of instructor. Next offered fall 2008.

CS 6460 Peer-to-Peer Systems

CS 6522 Biological Sequence Analysis
Fall. 4 credits. Prerequisites: none.

CS 6620 Advanced Interactive Graphics
Fall or spring. 4 credits. Prerequisite: CS 4620 and 4621 or 5620 or permission of instructor.

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.

CS 6670 Machine Vision
Fall or spring. 4 credits. Prerequisites: undergraduate-level understanding of algorithms and MATH 2210 or equivalent. Next offered 2009–2010.

CS 6700 Advanced Artificial Intelligence
Spring. 4 credits. Prerequisite: CS 4700 or permission of instructor. Next offered 2009–2010.

CS 6740 Advanced Language Technologies (also INFO 6300)
Fall or spring. 3 credits. Prerequisite: permission of instructor. Neither CS 4300 nor CS 4740 are prerequisites. Next offered fall 2008.

CS 6764 Reasoning about Knowledge
Fall. 4 credits. Prerequisites: mathematical maturity and acquaintance with propositional logic. Next offered 2010–2011.

CS 6766 Reasoning about Uncertainty
Fall. 4 credits. Prerequisites: mathematical maturity and acquaintance with propositional logic. Next offered 2009–2010.

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 2009–2010.

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).

CS 6810 Theory of Computing
Spring. 4 credits. Prerequisite: CS 3810 and CS 4820 or 6820 or permission of instructor.

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 spring 2009.

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 2009–2010.

CS 6850 The Structure of Information Networks (also INFO 6850)
Fall or spring. 4 credits. Prerequisite: CS 4820.

CS 7090 Computer Science Colloquium
Fall. 4 credits. Prerequisite: CS 4820 or permission of instructor. S–U grades only.

CS 7110 Seminar in Programming Languages
Fall, spring. 4 credits. 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 6320 or permission of instructor. S–U grades only.

CS 7410 Topics in Systems
Fall or spring. 3 credits. Prerequisite: 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)
Fall. 4 credits. Prerequisite: programming experience or permission of instructor.

CS 7770 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 7890 Seminar in Theory of Algorithms and Computing
Fall, spring. 4 credits. Prerequisite: permission of instructor. S–U grades only.
**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 2008–2009 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 2008–2009, 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, ENGR 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 Computer 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
- **INFO 4560** Foundations of Artificial Intelligence

### 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.

- **ART 2500** Hip-Hop, Hollywood, and Home Movies
- **DANCE 2500/VISSIT 2711** Beginning Dance Composition
- **DANCE 3500** Intermediate Dance Composition I
- **DANCE 3510** Intermediate Dance Composition II
- **DANCE 3550** Techno Soma Kinesics I
- **DANCE 3660/THETR 3620** Lighting Design Studio I
- **DANCE 3560/MUSIC 3441/THETR 3690** Digital Performance
- **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/VISSIT 3305** Visual Perception
- **THETR 3650** Automated Lighting and Control Systems

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 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 pre- and/or corequisites.

- **ART 1700** Visual Imaging in the Electronic Age
- **ART 2072** Digital Video and Sound
- **ART 2703/CS 5640** Computer Animation
- **CS 5642** Advanced Computer Animation
- **FILM 1750, any five of the following. Note that some of these courses have MUSIC pre- and/or corequisites.
- **INFO 3450** Human–Computer Interaction Design
- **MUSIC 3111/3112/3113** Jazz Improvisation
- **MUSIC 3421** Scoring the Moving Image
- **MUSIC 3431/THETR 3680** Sound Design and Digital Audio
- **MUSIC 3441/THETR 3690** Digital Performance
- **MUSIC 4101** Counterpoint
- **MUSIC 4103** 20th-Century Musical Language
- **MUSIC 4111** Composition in Recent Styles
- **MUSIC 4112** Composition

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 pre- and/or corequisites.

- **ART 1700** Visual Imaging in the Electronic Age
- **ART 2500** Hip-Hop, Hollywood, and Home Movies
- **DANCE 2500/VISSIT 2711** Beginning Dance Composition
- **DANCE 3500** Intermediate Dance Composition I
- **DANCE 3510** Intermediate Dance Composition II
- **DANCE 3550** Techno Soma Kinesics I
- **DANCE 3660/THETR 3620** Lighting Design Studio I
- **DANCE 3560/MUSIC 3441/THETR 3690** Digital Performance
- **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/VISSIT 3305** Visual Perception
- **THETR 3650** Automated Lighting and Control Systems

Up to two courses from another track.
The interconnectedness of the components of our planet’s operation. The SES major grew out of the interactions among rock, water, air, and life in isolation. The SES major prepares students for a number of career paths in basic or applied sciences of our planet. The major can lead to graduate study and research in geology, geophysics, geochemistry, biogeochemistry, atmospheric sciences, ocean sciences, hydrology, or environmental engineering. Career opportunities in university research groups, governmental agencies, or the private sector deal with energy, mineral and water resources; natural hazards; weather and climate forecasting; and a host of environmental issues. The major can also prepare students for careers in environmental management and policy, law or medicine, science journalism, and K-12 science teaching.

Requirements for the Science of Earth Systems major

1. The Science of Earth Systems curriculum includes strong preparation in mathematics, physics, chemistry, and biology, including the following: MATH 1110–1120 (or MATH 1910–1920); Two semesters of chemistry: CHEM 2070–2080 or 2090–2080 or CHEM 2070–1570; PHYS 2207–2208 or 1112–2213; BIOG 1109–1110, 1101/1103–1102/1104 or 1105–1106 (a second semester of biology can be replaced by CHEM 1570 if CHEM 2070–2080 is selected; or replaced by a third semester of mathematics).

2. The required introductory course in Earth science, EAS 2200, The Earth System.

3. 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.

4. The specialization 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 specialization courses, depending upon the student’s choice of specialization. The specialization courses build depth and provide the student with a specific expertise in one facet of Earth system science. Four specializations are defined for the major: geology, biogeochemistry, atmospheric sciences, and ocean sciences. Other specializations can be tailored to a student’s interests in concert with the student’s advisor and approval of the curriculum committee. The specialization 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.

5. 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 specialization. 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 2520 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) Summer. 3 credits. C. Andronicos. 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) Fall. 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. Csine. 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 1121 Introduction to MATLAB (also CIS 1121)
Fall, spring. 8-week course. 2 credits. Prerequisites: MATH 1110, 1910, or equivalent. D. Fan. For description, see CIS 1121.

EAS 1190 Fossil Preparation
Fall. 1 credit. Prerequisite: EAS 1109 or related EAS course. W. Allmon and J. Csine. 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 1120) (PBS)
Spring. 3 credits. L. Brown. Explores the science of natural hazards and strategic resources. Techniques for locating and characterizing earthquakes and assessing the damage they cause; methods of using sound waves to image the earth's interior to search for strategic minerals; the historical importance of such resources. Seismic experiments on campus to probe for groundwater, the new critical environmental resource.

EAS 1310 Basic Principles of Meteorology (PBS)
Fall. 3 credits. M. W. Wysocki. Simplified treatment of the structure of the atmosphere: physical characteristics 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 1310.

EAS 1330 Basic Meteorology Lab
Fall. 1 credit. Prerequisite: EAS 1310. M. W. Wysocki. This course is required for atmospheric science majors, but is optional for other students taking EAS 1310.

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. Non-science 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 1560 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: sophomore 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 3030 Introduction to Biogeochemistry (also NTRES 3030) (PBS)
Fall. 4 credits. Prerequisites: EAS 2200, MATH 1120 or 1920, or CHEM 2070 or equivalent. 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 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: sophomore 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 3030 Introduction to Biogeochemistry (also NTRES 3030) (PBS)
Fall. 4 credits. Prerequisites: EAS 2200, MATH 1120 or 1920, or CHEM 2070 or equivalent. 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 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: sophomore 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 3030 Introduction to Biogeochemistry (also NTRES 3030) (PBS)
Fall. 4 credits. Prerequisites: EAS 2200, MATH 1120 or 1920, or CHEM 2070 or equivalent. 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 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: sophomore 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 (PBS)
Fall. 3 credits. Prerequisites: two semesters of calculus and one of physics. K. H. Cook. Processes that determine climate and contribute to its change are discussed, including atmospheric circulation, ocean circulation, and atmospheric dynamics. Contemporary climate change issues are investigated and discussed in the context of natural variability of the system.

EAS 3220 Biogeochemistry of the Hawaiian Islands (PBS)
Spring. 4 credits. Prerequisites: enrollment in Earth and Environmental Sciences Seminar 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 natural selection, and introductions to 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. A. T. Gaetano. The relationship of radiant energy, temperature, wind, and moisture in the atmosphere near the ground. The interplay between physical processes of the atmosphere and energy and mass transfer 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 3400 Field Study of the Earth System (PBS)
Spring. 6 credits. Prerequisites: enrollment in Earth and Environmental Sciences Seminar 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 plate tectonics; 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. A. T. Gaetano. Introduction to the thermodynamics and hydrosstatics 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 2970 or equivalent; one year of physics. K. H. Cook. 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. Text used is An Introduction to Dynamic Meteorology by Holton.

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; next offered 2009–2010. C. H. Greene and R. W. Howarth.

EAS 3510 Conservation Oceanography (also BIOEE 3510) (PBS)
Spring. 4 credits. Prerequisites: EAS 3400; enrollment in Earth and Environmental Sciences Seminar 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 region 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. 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, but the course will emphasize the basic physical principles at play, and not just the mathematical results. Student presentations of recent research papers will elaborate principles learned in the course.

EAS 4010 Fundamentals of Energy and Mineral Resources (PBS)
Fall. 3 credits. 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; current year; future year, 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; next offered 2009–2010. R. Lohman.

EAS 4060 Marine Geology and Geophysics
Spring. 4 credits. Prerequisite: EAS 2200 or comparable courses; completion of some EAS classes helpful, but not required. 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 (PBS)
Summer. 3 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 of the field mapping of a broad range of variety 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 grade 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 2009–2010. J. Phipps Morgan and C. Andreasen.

[EAS 4300] Seminar on Climate Change Science, Impacts, and Mitigation
Fall. 2 credits. Prerequisites: junior or higher standing. Offered alternate years; next offered 2009–2010. N. Mahowald.

[EAS 4470] Physical Meteorology (PBS)
Fall. 5 credits. Prerequisites: one year each of calculus and physics. Offered alternate years; next offered 2009–2010. 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. 5 credits. Prerequisites: EAS 410 and 420. S. J. Colucci.
Structure and dynamics of large-scale, mid-latitude weather systems; features of temperature, wind, and pressure fields. Lecture 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 4520] Marine Ecology (also BIOEE 4620) (PBS)
Spring. 3 credits. Prerequisites: EAS 3520 and 4510. TBA. M. W. Wysocki.
Provides an overview of the marine environment with an emphasis on ecological processes; oceanography; and the distribution, abundance, and interaction of marine organisms. Includes discussions of primary and secondary production; plankton; and the interactions of species and ecosystems in the marine environment.

[EAS 4550] Geochemistry (PBS)
Fall. 4 credits. Prerequisites: CHEM 2070 or 2090 or permission of instructor. Offered alternate years; next offered 2009–2010. M. Goman.
Covers petrology, mineralogy, and geochemistry. Topics include the origin of magmas, distribution of elements in the Earth's crust, and the principles of geochemistry.

[EAS 4560] Mesoscale Meteorology (PBS)
Spring. 3 credits. Prerequisites: EAS 410 and 420 or permission of instructor. Next offered 2009–2010. S. J. Colucci.

[EAS 4570] Atmospheric Air Pollution (PBS)
Fall. 3 credits. Prerequisites: EAS 410 or environmental science. Offered alternate years; current year; future year 2010–2011. R. W. Kay.
Covers toxicology and impact phenomena in the solar system. Includes topics such as photochemistry, 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] Palaeoclimate: Since the Last Ice Age
Fall. 5 credits. Prerequisites: EAS 2200 or permission of instructor. Offered alternate years; next offered 2009–2010. M. Goman.
Explores topics in Late Quaternary palaeoclimatology. Broadly divided into sections: (1) lectures that cover a variety of topics, such as climate models, 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 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 multiscalar 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 Ground Water (also BEE 4710) (PBS)
Spring. 3 credits. Prerequisites: MATH 2940 and ENGRD 2020. Offered alternate years; next offered 2009–2010. L. Cathles and T. 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. R. Ball; spring: 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; next offered 2009–2010.  
T. E. Jordan.

EAS 4780 Advanced Stratigraphy (PBS)  
Fall. 3 credits. Prerequisite: EAS 3010 or permission of instructor. Offered alternate years; current year, future year, 2010–2011.  
T. E. Jordan.

Covers advanced improvements on traditional methods of the study of ages and of genetic relations among sedimentary rocks, emphasizing 3-D relationships. Introduces techniques of sequence stratigraphy at scales ranging from beds to entire basins. Considers physical correlation, dating techniques, and time resolution in sedimentary rocks as well as physical controls on the stratigraphic record and numerical modeling.

EAS 4790 Paleobiology (also BIOEE 4790) (PBS)  
Spring. 4 credits. Prerequisites: one year of introductory biology and either BIOEE 2740, 3700, 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 4810 Survey of Earth Systems  
Fall, spring. 2 credits each semester. Fall: R. Kay; spring: J. Cisne.

Weekly seminar for seniors in the Science of Earth Systems major on current topics in Earth System Science. Readings, presentations and discussions will be drawn from the current literature, including how to analyze a scientific paper, and exploration of connections across the sub-disciplines in the field. The course will serve as both a review of key concepts, and a vehicle to explore developing concepts in the field.

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 Environmental Biophysics (also CSS 4830) (PBS)  
Spring. 3 credits. Prerequisite: CSS 2600 or equivalent calculus. H. Van Es and S. J. Rha.

For description, see CSS 4830.

EAS 4840 Inverse Methods in the Natural Sciences (PBS)  
Fall. 3 credits. Prerequisite: MATH 2940. 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. 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 4070) (PBS)  
Fall. 3 credits. Prerequisite: PHYS 2208 or 2213 or equivalent 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 Sciences (under curate lecture)  
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. 2 credits. Prerequisites: EAS 3400; enrollment in Earth and Environmental Sciences Semester in Hawaii. S–U grades only. A. Moore. During the last third 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. L. Cathles and M. Wisocki.

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 Measurement and Discovery
Fall. 1 credit (S–U grades) or 2 credits (w/paper, letter grades). Prerequisite: consent 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 vigorous 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; next offered 2009–2010. 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; next offered 2009–2010. R. W. Allmendinger.
Geometry, kinematics, and mechanics of structural provinces. Concentrates on thrust belts, rift provinces, or strike-slip provinces.

[EAS 5330 Advanced Petrology]
Fall. 3 credits. Prerequisite: EAS 4540. Offered alternate years; next offered 2009–2010. R. W. Kay.

[EAS 5750 Planetary Atmospheres (also ASTRO 6575)]
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 5840 Inverse Methods in the Natural Sciences]
Fall. 3 credits. Prerequisite: MATH 2940.
D. L. Hysek.
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 taking the course for advanced (5000-level) credit will be expected to complete and present a substantial class project to be negotiated with the instructor.

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. 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; Eigen-analysis of linear systems; feedback and nonlinear cases; problems of uncertainties in natural systems; modeling software such as Stella II and MATLAB; and applications to current research of participants or from recent literature.

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. 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.

EAS 6520 Advanced Atmospheric Dynamics (also ASTRO 7652)
Spring. 3 credits. Prerequisites: EAS 3410 and 3420 or equivalent. S. J. Colucci.

EAS 6560 Isotope Geochmistry
Spring. 3 credits. Open to undergraduates. Prerequisite: EAS 450 or permission of instructor. Offered alternate years.
W. M. White.
Nucleosynthetic processes and the isotopic abundance of the elements; geochronology and cosmochronology using radiometric decay schemes, including U-Pb, Rb-Sr, Sm-Nd, K-Ar, U-series isotopes, and cosmogenic isotopes such as 14C and 36Cl. Use of radiogenic and stable isotope evidence regarding the formation of the Earth and the solar system Stable isotopes and their use in geothermometry, ore petrogenesis, and the global climate system.

EAS 6660 Applied Multivariate Statistics
Spring. 3 credits. Prerequisites: multivariate calculus, matrix algebra, and two statistics courses. Offered alternate years.
D. S. Wilks.

EAS 6750 Modeling the Soil-Plant-Air 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. Offered alternate years. 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 7100 Thesis Research
Fall, 7020, spring. 1–15 credits, variable. Staff.

EAS 7110 Upper Atmospheric and Space Physics
Fall or spring. 1–6 credits. Seminar course.

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 biophysics, 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 Geochmistry
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 7710 Advanced Topics in Sedimentology and Stratigraphy
T. E. Jordan.

EAS 7730 Paleobiology
J. L. Cisne.
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 centers 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


The study of economics provides an understanding of the way economies operate and an appreciation of the economic factors that influence events in a diverse array of fields. The study of economics is generally divided into microeconomics and macroeconomics. Microeconomics focuses on the economic activities of individuals and businesses, and macroeconomics analyzes the economy as a whole. The Department of Economics offers a broad range of undergraduate courses that provide students with a deep understanding of the way economies operate and an appreciation of the economic factors that influence events in a diverse array of fields. The study of economics provides an understanding of the way economies operate and an appreciation of the economic factors that influence events in a diverse array of fields.

ECON 1110 (Economics and the Law) or ECON 1120 (Economics and the Environment)

ECON 3610–3620 (International Trade and Finance)

ECON 3510 or 3520 (Industrial Organization)

ECON 3370 (Equilibrium and Welfare Economics)

ECON 3670 (Game Theoretic Methods) or ECON 3680 (Game Theory)

ECON 4150 (Intertemporal Economics)

ECON 4190 (Economic Decisions under Uncertainty)

ECON 4460 (Topics in Macroeconomic Analysis)

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 3250 (Cross Section and Panel Econometrics) or ECON 3270 (Time Series Econometrics)

ECON 3370 (Equilibrium and Welfare Economics)

ECON 3670 (Game Theoretic Methods) or ECON 3680 (Game Theory)

ECON 4150 (Intertemporal Economics)

ECON 4190 (Economic Decisions under Uncertainty)

ECON 4460 (Topics in Macroeconomic Analysis)

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 3250 (Cross Section and Panel Econometrics) or ECON 3270 (Time Series Econometrics)

ECON 3370 (Equilibrium and Welfare Economics)

ECON 3670 (Game Theoretic Methods) or ECON 3680 (Game Theory)

ECON 4150 (Intertemporal Economics)

ECON 4190 (Economic Decisions under Uncertainty)

ECON 4460 (Topics in Macroeconomic Analysis)

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 3250 (Cross Section and Panel Econometrics) or ECON 3270 (Time Series Econometrics)

ECON 3370 (Equilibrium and Welfare Economics)

ECON 3670 (Game Theoretic Methods) or ECON 3680 (Game Theory)

ECON 4150 (Intertemporal Economics)

ECON 4190 (Economic Decisions under Uncertainty)

ECON 4460 (Topics in Macroeconomic Analysis)

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 3250 (Cross Section and Panel Econometrics) or ECON 3270 (Time Series Econometrics)

ECON 3370 (Equilibrium and Welfare Economics)

ECON 3670 (Game Theoretic Methods) or ECON 3680 (Game Theory)

ECON 4150 (Intertemporal Economics)

ECON 4190 (Economic Decisions under Uncertainty)

ECON 4460 (Topics in Macroeconomic Analysis)

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 3250 (Cross Section and Panel Econometrics) or ECON 3270 (Time Series Econometrics)

ECON 3370 (Equilibrium and Welfare Economics)

ECON 3670 (Game Theoretic Methods) or ECON 3680 (Game Theory)

ECON 4150 (Intertemporal Economics)

ECON 4190 (Economic Decisions under Uncertainty)

ECON 4460 (Topics in Macroeconomic Analysis)

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 3250 (Cross Section and Panel Econometrics) or ECON 3270 (Time Series Econometrics)

ECON 3370 (Equilibrium and Welfare Economics)

ECON 3670 (Game Theoretic Methods) or ECON 3680 (Game Theory)

ECON 4150 (Intertemporal Economics)

ECON 4190 (Economic Decisions under Uncertainty)

ECON 4460 (Topics in Macroeconomic Analysis)

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 3250 (Cross Section and Panel Econometrics) or ECON 3270 (Time Series Econometrics)

ECON 3370 (Equilibrium and Welfare Economics)

ECON 3670 (Game Theoretic Methods) or ECON 3680 (Game Theory)

ECON 4150 (Intertemporal Economics)

ECON 4190 (Economic Decisions under Uncertainty)

ECON 4460 (Topics in Macroeconomic Analysis)

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 3250 (Cross Section and Panel Econometrics) or ECON 3270 (Time Series Econometrics)

ECON 3370 (Equilibrium and Welfare Economics)

ECON 3670 (Game Theoretic Methods) or ECON 3680 (Game Theory)

ECON 4150 (Intertemporal Economics)

ECON 4190 (Economic Decisions under Uncertainty)

ECON 4460 (Topics in Macroeconomic Analysis)
ECOnOmics 529

In addition to completing the economics major, each student 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:

- If 3010 is taken and a grade of B or better is earned, it can only receive college credit.
- If 3010 is not taken, either both 1110 and 3130 can receive college credit.
- 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:

- If 3020 is taken and a grade of B or better is earned, it can only receive college credit.
- If 3020 is not taken, either both 1120 and 3140 can receive college credit.
- If 3020 is taken and a grade of less than B is earned, only 3020 and 3140 can receive college credit.

Courses

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 1110 and 1120. An introduction to the theory of national income determination, unemployment, growth, and inflation.

ECON 3070 Introduction to Peace Science (also CRP 3850) (SBA-AS)
Winter session. 3 credits. Prerequisites: ECON 1110–1120 or permission of instructor.

Introduction to the theories of and research on conflict resolution. Topics include conflict, its role and impact on society; theories of aggression and altruism; causes of war; game theory; conflict management procedures and other analytical tools and methods of peace science; and alternatives to war.

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 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 1100–1120.

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 (mean, 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 (MGR)
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 analysis. Applications from economics are used to illustrate the methods covered in the course.

ECON 3230 American Economic History (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.

Surveys problems in American economic history from the Civil War to World War I.

ECON 3250 Cross Section and Panel Econometrics (MGR)
Spring. 4 credits. Prerequisite: ECON 3200. Introduction to cross-section and panel econometrics. Topics include multiple-regression analysis with qualitative information to models, simple and advanced panel data methods, informal variable, estimation, simultaneous equation models.

ECON 3270 Time Series Econometrics (MGR)
Spring. 4 credits. Prerequisite: ECON 3200. Introduction to time-series econometrics. Topics include stationary time series, ARMA models, multivariate models, non-stationary models and unit roots, and co-integration.

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 3190, or equivalent, and one semester of calculus.

Analyses the role of government in a free market economy. Topics include public goods,
market failure, 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. Next offered 2010–2011.
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 3370 Equilibrium and Welfare Economics (SBA-AS)]
Fall. 4 credits. Prerequisites: ECON 3130, 3190. Next offered 2010–2011.
Introduction to the theory of competitive equilibrium and economic efficiency. Begins with a review of the Walrasian model and identifies conditions under which a price-guided decentralized competitive economy achieves an optimal allocation of resources. Presents a number of celebrated examples and applications: the standard 2x2x2 model of international trade; Leontief's input-output model, Morishima's interpretation of labor theory of value, Arrow's analysis of uncertainty and Amartya Sen's analysis of famines. Finally, problems of market failure are reviewed.

[ECON 3390 State and Local Public Finance (SBA-AS)]
Examines the role of subnational governments and jurisdictions in the economy. Among the broad questions addressed are: what tasks are optimally assigned to local governments? What impact can such assignment have on equity and efficiency? How do intergovernmental financial relations affect these outcomes? The model and evidence on these issues are analyzed, with frequent application to current issues, like debates surrounding local, school district-based provision of education.

[ECON 3410 Economics of Wages and Employment II (SBA-AS)]
For description, see ILRLE 4100.

[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 3550 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.

[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. 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 about 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. 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)]
Fall. 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-AR)]
Fall. 4 credits. Prerequisite: ECON 3130. Next offered 2010–2011.
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 4 (HA-A)]
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 4200 Policy Analysis: Welfare Theory, Agriculture, and Trade (SBA-AS)**

For description, see AEM 6300.

**ECON 4310 Monetary Economics (MQR)**

Spring. 4 credits. Prerequisites: ECON 3130 and 3140. Next offered 2010–2011. Covers monetary theory, history, and policy. Topics include transaction costs, centralized and bilateral trading, media of exchange, international exchange and monetary arrangements, and central bank and its policy.

**ECON 4340 Financial Economics, Indications, 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 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 institutionalist; the original intent of laisser-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; Linus Kim about Korean policy—are subsequent difficulties the necessary price for the early triumphs? industrial policy without protectionism (the cases of Singapore and Pentan, Malaysia)—viable approaches under the WTO rules; (4) present developments and implications; trade frictions (the export expansion of the PRC); environmental concerns.

**ECON 4470 Economics of Social Security (SBA-AS)**

For description, see PAM 3460.

**ECON 4500 Resource Economics (SBA-AS)**

For description, see AEM 4500.

**ECON 4540 China and India: Growth Miracle (also AEM 4540)**

For description, see AEM 4540.

**ECON 4550 Income Distribution (SBA-AS)**

For description, see ILRLE 4410.

**ECON 4560 The Economics of Employee Benefits (SBA-AS)**

For description, see ILRLE 4420.

**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 4590 Economic History of British Labor 1750 to 1940 (SBA-AS)**

For description, see ILRLE 4490.

**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 3110–1120 or permission of instructor. Next offered 2009–2010. Examines the development of the Chinese economy and the evolution of China’s economic system between the early 1990s 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 Inequality: A Global Perspective**

For description, see NS 4570.

**ECON 4750 The Economy of India @ (SBA-AS)**

Fall. 4 credits. Prerequisite: ECON 3110–1120 or equivalent background. 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. Prerequisite: ECON 4750, or equivalent. 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 4940 Economic Methods for Engineering and Management**

For description, see CEE 5940.

**ECON 4980 Independent Study on 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 non-competitive 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; Ricardo 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 6180 Intermediate Mathematical Economics II**
Continuation of ECON 6170. Develops additional mathematical techniques for applications in economics. Topics may include study of dynamic systems (linear and nonlinear difference equations, differential equation, chaotic behavior), dynamic optimization methods (optimal control theory, nonstochastic and stochastic dynamic programming), and game theory (repeated dynamic and evolutionary games.)

**ECON 6190 Econometrics I**
Fall. 4 credits. Prerequisite: ECON 5190–5200 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 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 6910 Health Economics I**
For description, see PAM 6910.

**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**
Spring. 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 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.

**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 6900–6100 (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**

**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 7210 Time Series Econometrics**
Fall. 4 credits. Prerequisite: ECON 6190–6200 or permission of instructor.
Covers traditional and current time series techniques that are widely used in econometrics. Topics include the theory of stationary stochastic processes including univariate ARMA(p,q) models, spectral density analysis, and vector autoregressive models; parametric and semi-parametric estimation; current developments in distributional theory; and estimation and testing in models with integrated regressors including, unit root tests, cointegration, and permanent vs. transitory components.

**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 7231 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 7410 or permission of instructor.

Covers advanced topics in monetary economics, macroeconomics, and economic growth—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 fundamentals of welfare economics, in-depth analysis of social choice theory and the theory of 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 7370 Location Theory and Regional Analysis
Fall. 4 credits. Prerequisites: ECON 6090, 6170, and econometrics course. Next offered 2010–2011.

Covers economic principles influencing the location of economic activity; its spatial equilibrium structure, and dynamic forces. Topics include spatial pricing policies, price competition, and relocation by firms; residential location patterns; patterns of regional growth and decline; and patterns of urbanization.

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 7390 Advanced Topics in State and Local Public Finance
Spring. 4 credits. Prerequisites: ECON 6090, 6200.

Provides an in-depth examination of microeconomic theory surrounding the role of subnational governments and jurisdictions in the economy. Among the broad questions addressed are: What tasks are optimally assigned to local governments? What impact can such assignment have on efficiency and equity? In addition to the theoretical foundations on these issues, the course explores recent empirical evidence in this area, with particular attention to the research designs and data used in relevant papers.

ECON 7400 Social and Economic Data
Spring. 4 credits.

For description, see ILRLE 7400.

ECON 7410 Seminar in Labor Economics
For description, see ILRLE 7420.

ECON 7420 Seminar in Labor Economics
For description, see ILRLE 7450.

ECON 7430 Seminar in Labor Economics
For description, see ILRLE 7460.

ECON 7470 Economics of Higher Education
For description, see ILRLE 7470.

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, reputation 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 economics. 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
Spring. 4 credits. Prerequisites: economics graduate core.
Focuses on empirical methods for the analysis of household survey data. Explores the hands-on use of such data to address policies related to welfare outcomes, particularly nutrition, health, education, and poverty. Covers empirical methods as they apply to a series of measurement and modeling issues, as well as the valuation of interventions. While underlying theory is reviewed briefly, the course attempts to bridge the gap between theory and practice, addressing issues such as model identification, functional form, estimation techniques to control for endogeneity and heterogeneity, and so forth.
The course grade is based primarily on two empirical exercises, and related write-up, as well as class participation. Students are given actual household data sets and software with which to conduct exercises. These data enable students to apply analytical techniques discussed. Data sets are provided from African, Asian, and Latin American countries.

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 work that seek to explain economic development, or lack thereof, in countries at low-income levels. Specific topics vary each semester.

ECON 7740 Economic Systems
Spring. 4 credits. Prerequisite: ECON 6090.
Deals with economic systems, formerly centrally planned economies, and economies in transition.

ECON 7750 Development Microeconomics
Spring. 4 credits. Prerequisites: economics graduate core.
Explores the application of microeconomic analysis to economic issues in developing countries. Focuses on household behavior and the analysis or rural institutions. Covers the neoclassical agricultural household model and recent developments in the theory of the household, topics in rural economics, financial arrangements, program evaluation and the interaction of social norms and economic organization. Designed to prepare students for applied research in micro development economics by giving an overview over the current state of research in that discipline.

ENGLISH
The Department of English offers a wide range of courses in English, American, and Anglophone as well as international, creative, literary, expository, and critical 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 their work—responsive, sensitive, critical writing with the study of literature. Others pursue interests in such areas as women's literature, African-American 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 the following 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, 8 credits (two courses) must be at the 400 level or above; 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; 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 to begin meeting this requirement since it provides an overview of earlier periods of British literature and so enables them 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 supplement provides information on concentrations 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 departmental courses. Students may continue to take the major 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 must 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 will have to take it when they return as seniors. They 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 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 apply 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 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 section limited to 17 students. Recommended for prospective English majors. This course does not satisfy requirements for the English major. How can we become more appreciative, alert readers of poetry, and at the same time better writers of prose? This course attends to the rich variety of poems written in English, drawing on the works of poets from William Shakespeare to Sylvia Plath, John Keats to Li-Young Lee, Emily Dickison to A. R. Ammons. We may read songs, sonnets, odes, villanelles, even limericks. By engaging in thorough discussions and varied writing assignments, we explore some of the major periods, modes, and genres of English poetry, and in the process 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 Caryil Churchill, Ntozake 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, summer, and winter. 4 credits. Each semester limited to 16 students. Students must have completed their colleges’ first-year writing requirements or have permission of instructor. S. Davis and staff. Web site: instruct1.cit.cornell.edu/ Courses/en288-289. This course does not satisfy requirements for the English major.

ENGL 2880–2890 offers guidance and an audience for students who wish to gain skill in expository writing in terms of critical, reflective, 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 courses are seminar courses, they depend on members’ full participation, regular attendance and submission of written work are required. Students and instructors will confer individually throughout the semester.


See English department course offerings for full fall and spring section descriptions.

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(½): Nabokov’s Pale Fire, Bronte’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 instruct1.cit.cornell.edu/~sad4/381.

ENGL 3860 Philosophical 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, philosophical 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 Phaedras 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 instruct1.cit.cornell.edu/~sad4/386.

[ENGL 3870 Autobiography: Theory and Practice (LA-AS)]

[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. Next offered 2009–2010.

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 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: sec 1, J. R. London; sec 2, K. McClane; Spring: sec 1, L. Van Cleef-Stefanoff. 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 semester. Each section limited to 15 students. Prerequisite: ENGL 2800 or 2810 and permission of instructor based on submission of manuscript (bring manuscript to first day of class). Fall: sec 1, K. McClane; sec 2, L. Van Cleef-Stefanoff.

Spring: sec 1, L. Van Cleef-Stefanoff; sec 2, K. McClane.

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: sec 1, S. Vaughn; sec 2, E. Quinones; spring: K. McClane and M. Balzer.

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.

Introductions to Literary Studies

ENGL 2000 Introduction to Criticism and Theory (LA-AS)
Fall. 4 credits. S. Mohanty.

This is an introductory course that explores some of the key concepts and methods used in literary studies. Focusing on a few literary texts and some drawn from popular culture, we will try to answer such basic questions as: What does it mean to read and analyze texts well? What roles does history and social ideology play in our readings? What, after all, is "art"? We will also focus on literary and cultural theory, examining both contemporary questions and historical ones. Readings on aesthetics and critical theory from a variety of cultural traditions will be analyzed—from classical writings on beauty and the nature of art to contemporary works that focus on such issues as gender, race, and sexuality.

ENGL 2010–2010 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) M. Raskolnikov. An introduction to the study of English literature, examining its historical development and achievements from its “beginnings” to the middle of the 17th century. Focus will be on honing close reading skills so necessary to English majors through the reading of major works from a range of genres and modes, including heroic poem, romance, drama, fabliau, sonnet...
sequence, love lyric, pastoral, and epic. The syllabus includes Beowulf, Sir Gawain and the Green Knight, selections from Chaucer’s Canterbury Tales, Elizabethan sonnets, Shakespeare’s A Midsummer Night’s Dream, poems by Donne, Marvell, and Herbert, and selections from Wordsworth’s The Prelude. For the complexities of the English language sought after but not required.

2020 (spring). P. Sawyer: From powdered wigs and sex comedies to romantic odes to Stoppard and Rushdie: a survey of 250 years of British poetry, 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, A Room of One’s Own, Quidditch, 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. E. Cheyfitz. Through readings of various kinds of narrative, both oral and written, from various perspectives of race, gender, class, and sexuality, this course will encourage critical thinking about the emergence of the United States from European imperialism. Readings will be taken from a list that includes Navajo origin narratives of Christopher Columbus; Shakespeare’s The Tempest; Mary Rowlandson’s narrative of Indian captivity; the human-rights discourses of Thomas Jefferson, the women’s rights convention at Seneca Falls, David Walker, William Apess, Ralph Waldo Emerson, and Henry David Thoreau; the autobiographical narratives of African slavery of Frederick Douglass and Harriet Jacobs; the poetry of Walt Whitman, and the fiction of Herman Melville, Harriet Beecher Stowe, James Fenimore Cooper, and Lydia Maria Child.

ENGL 2040 Introduction to American Literatures: The Making of America: Reconstruction to the Present (also AMST 2040) (LA-AS)
Spring. 4 credits. K. Artell. This course will introduce students to American literature from the end of the Civil War to the present Iraq War. We will consider a great 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 create? What literary conventions do they expedite, revise, and recreate in order to articulate individual, national and global selves?

ENGL 2050 Introduction to World Literatures in English (also FGSS 2050) (LA-AS) @
Spring, 4 credits. C. O. Elena. In this course we will read contemporary literature in English from Africa, the Caribbean, the Middle East, South Asia, and the Pacific Islands (including New Zealand). We will examine how the literatures produced in the former colonies of the British Empire are in a dialogue with each other, and explore how they engage and contest the legacies of western colonialism. The course will be particularly concerned with addressing how the intersections between gender, sexuality, nation, ethnicity, and religion help us understand the global production of postcolonial texts.

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 Ford, Jhumpa Lahiri, Alison Lurie, Dan McCall, Maureen McCoy, Lorrie Moore, Robert Morgan, J. Robert Lennon, Toni Morrison, Vladimir Nabokov, Stewart O’Nan, Thomas Pynchon, Stephanie Vaughn, Helen 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. R. Gilbert. This course will survey English-language poetry written in the 20th century, with primary emphasis on American poets. We will consider poems written in traditional verse as well as in innovative forms; short poems and long poems; poems that are relatively easy to read and poems that are extremely challenging; poems that deal with issues of war, race, gender, sex, science, and other topics; important poetic movements like Symbolism, Imagism, Confessional, and Beat poetry. Poets to be studied may include W. B. Yeats, Robert Frost, Ezra Pound, W. C. Williams, Wallace Stevens, Gertrude Stein, T. S. Eliot, Langston Hughes, Allen Ginsberg, and Sylvia Plath. Students will submit weekly reading responses, some of which may take the form of original poems. Two essays and a final exam.

ENGL 2080 Shakespeare and the 20th Century (LA-AS)
Spring. 4 credits. S. Davis. This course may be used as one of the three pre-1800 courses required of English majors. 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 2009: Titus Andronicus, Hamlet, Macbeth, Taming of the Shrew, and Measure for Measure; together with four plays by Tom Stoppard and Aime Césaire, films directed by John Madden, Julie Taymor, Vishal Bhardwaj, Peter Greenaway, and Fred Wilcox, the musical Kiss Me Kate, and the Reduced Shakespeare Company’s The Complete Works of William Shakespeare (abridged). See instruct1.cit.cornell.edu/~sada4/208.

ENGL 2090 Introduction to Cultural Studies (CA-AS)
Spring. 4 credits. G. Farred.

ENGL 2270 Shakespeare and/as Theory (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. P. Lorenz. The plays of Shakespeare have been particularly fertile ground for what has come to be known as literary theory. From Freud’s seminal speculations, through old and new historicists, Marxians, feminists, eco-critics, deconstruction, and queer theory, Shakespeare has been instrumental in the development of our ways of seeing literature itself. But why Shakespeare, in particular? Are the reasons historical? Theatrical? Related to something unique in Shakespearean language? Concentrating on the late plays, the course explores the question of Shakespeare and/as Theory. Plays include Hamlet, Measure for Measure, Othello, King Lear, Macbeth, Antony and Cleopatra, The Winter’s Tale, and The Tempest. We will also read texts by Freud, Marx, Foucault, Derrida, Greeblatt, Butler, Kristeva, and Lacan.

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 nineteenth 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, Glorida Anzaldúa, Sandra Cisneros, Junot Díaz, Manuel Muñoz, and Pedro Pietri.

ENGL 2510 20th-Century Women Writers (also AMST 2510, FGSS 2510) (LA-AS)
Fall. 4 credits. Next offered 2009–2010.

ENGL 2520 Late 20th-Century Women Writers and Visual Culture (also AMST 2520) (LA-AS)

ENGL 2600 Introduction to American Indian Literatures in the United States (also AMST 2600) (LA-AS)

ENGL 2620 Asian American Literature (also AAS/AMST 2620) (LA-AS)
Spring, 4 credits. 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 closely 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 2730 Children’s Literature (LA-AS)
Fall. 4 credits. J. Adams.
An historical study of children's literature from the 17th century to the present, principally in Europe and America, which will explore the changing literary forms in relation to the social history of childhood. Ranging from oral folktales to contemporary novelistic realism (with some glimpses at film narratives), major figures include Perrault, Newbery, the Grimms, Andersen, Carroll, Alcott, Stevenson, Burnett, Kipling, the Disney studio, E. B. White, C. S. Lewis, Sendak, Silverstein, Mildred Taylor, Bette Greene. We'll also encounter a variety of critical models—psychoanalytic, materialist, feminist, structuralist—that scholars have employed to explain the variety and importance of children's literature.

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. May be used as one of the three pre-1800 courses required of English majors. H. Shaw and T. 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)

ENGL 2770 Literatures of the Black Atlantic: Reading the Contemporary (LA-AS)

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 representational 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 Troyes'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 2130 Cultures of the Middle Ages # (CA-AS)
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. Next offered 2009–2010. A. Galloway.

ENGL 2150 The American Musical (also THETR 3150, AMST 2105, MUSIC 2250) (LA-AS)
Fall. 4 credits. N. Salvato.

For description, see THETR 2150.

ENGL 2170 History of the English Language (also LING 2217) # (HA-AS)

ENGL 2630 Studies in Film Analysis: Hitchcock (also FILM 2650) (LA-AS)

ENGL 2640 The Private I and the Public Eye: Exploring Latino/a Identity in Poetry, Fiction, and Non-Fiction (CA-AS)

ENGL 2680 Culture and Politics of the 1960s (also AMST 2680) (CA-AS)

ENGL 2920 Introduction to Visual Studies (also COML/ VISST 2000) (LA-AS)

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. J. Culler.

Study of issues in contemporary theoretical debates, with particular attention to structuralism, deconstruction, psychoanalysis, and feminism. Readings by Roland Barthes, Judith Butler, Jacques Derrida, Michel Foucault, Barbara Johnson, Jacques Lacan, and others. No previous knowledge of literary theory is assumed.

ENGL 3080 Icelandic Family Sagas # (LA-AS)
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. Next offered 2009–2010. T. Hill.

ENGL 3090 Autobiography: The Politics of History, Memory, and Identity (LA-AS)

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. T. Hill.

The course is intended as an introduction to the Old English language. We will begin with simple prose texts and proceed to poetic texts such as Maldon, The Wanderer, The Seafarer, and The Dream of the Rood. The primary aim of the course is to learn Old English, but we will discuss the literary issues the texts we cover present. There will be a midterm 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. S. Zacher.

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. S. Zacher.

The course will provide a sampling of medieval English literature from the 13th to the 15th centuries, with works including Pearl, Sir Gawain and the Green Knight, Chaucer's Prioress's Tale, Sir OrfEO, and excerpts from the Ancrene Wisse and Mandeville's Travels. Since we will be learning Middle English in the process, ample time will be devoted to understanding the rudiments of the language. We will also consider themes of "otherness" as they relate to aspects of race, gender, and religion in the works we read. Consideration will be given to how the texts use geographical, physical, and psychological borders in order to problematize distinctions between the natural and supernatural, the normal and the monstrous, the worldly and otherworldly, the interior and exterior.

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. T. Hill.

Chaucer became known as the "father of English poetry" before he was entirely cold in his grave. Why is it 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 3320 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. J. Mann.

This course will introduce you to the history of English theater between 1590 and 1630, what is often called the "golden age" of English drama. Widening our focus beyond the works of Shakespeare, we will study a range of theatrical genres, including closet drama, city comedy, trigocomedy, and revenge tragedy. Students will learn about the conventions of writing and performance in a variety of theatrical spaces, as well as the social and political effects of the theater in the Elizabethan and Jacobean world. Readings will include plays by Kyd, Marlowe, Shakespeare, Jonson, Beaumont and Fletcher, Ford, Webster, Middleton, Dekker, and Rowley.
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. Cornell.

ENGL 3270 Shakespeare (LA-AS)
Fall. 4 credits. Next offered 2009–2010.

ENGL 3280 The Bible as Literature (LA-AS)
Fall. 4 credits. Next offered 2010–2011.

ENGL 3290 Milton (LA-AS)
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. R. Kalas.

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. Bogl.

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. Chao.

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.

ENGL 3400 Studies in Romantic Literature: The English Romantic Period (LA-AS)
Fall. 4 credits. R. Parker.

ENGL 3450 The Victorians (LA-AS)
Fall. 4 credits. J. Adams.

ENGL 3480 Studies in Women’s Literature: Feminist Literary Traditions (also AMST 3481, FGSS 3480) (LA-AS)
Spring. 4 credits. 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. R. Salomon.

ENGL 3550 Decadence (also FGSS 3550) (LA-AS)
Fall. 4 credits. E. Hanson.

ENGL 3600 Another World Is Possible: R. The American Left Since the 1960s (also AMST 3600) (LA-AS)
Fall. 4 credits. Next offered 2010–2011.

ENGL 3610 Studies in the Formation of U.S. Literature: Emerson to Melville (also AMST 3610) (LA-AS)
Spring. 4 credits. 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)

ENGL 3640 Studies in U.S. Literature After 1950: Native Daughters Speak (also AMST 3620) (LA-AS)

ENGL 3650 American Literature Since 1945 (also AMST 3650) (LA-AS)
Fall. 4 credits. Next offered 2010–2011.

ENGL 3660 Studies in U.S. Fiction Before 1900: The 19th-Century American Novel (also AMST 3660) (LA-AS)

ENGL 3670 Studies in U.S. Fiction After 1900 (also AMST 3670) (LA-AS)
Fall and spring. 4 credits.

ENGL 3680 Faulkner (LA-AS)
Spring. 4 credits. J. Braddock.

ENGL 3700 Modern Fiction and Culture. J. Braddock.
This course will survey some of the significant themes and movements preoccupying 20th-century fiction as well as some of the major U.S. writers such as Henry James, Zora Neale Hurston, Thomas Pynchon, and Willa Cather.

ENGL 3710 Modern Fiction and Culture. J. Braddock.
This course will survey some of the significant themes and movements preoccupying 20th-century fiction as well as some of the major U.S. writers such as Henry James, Zora Neale Hurston, Thomas Pynchon, and Willa Cather.
ENGL 3690 Fast-Talking Dames and Sad Ladies: 1940s and Now (also FILM/FGS 3690) (LA-AS)
Fall. 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 19th-Century Novel (LA-AS)
Fall. 4 credits. D. Faulkner.
Desire and betrayal; greed and ambition; revenge and murder; the fallen woman; the sadistic damage done to helpless children: in short, the plot of the 19th-century novel. In Britain, traditional forms of life faced wrenching pressures from the revolutionary advent of industrial capitalism and colonial domination in a frenetic global economy. The realistic novel, intertwining domestic and imperial spaces, embodied the most innovative attempt to grasp such drastic transformations in a popular idiom for a rising mass readership. These works reframe the sexual and cultural anxieties of the age, as well as suggesting the sources of redemption. We can take pleasure in these fictions even as we learn to analyze them critically. Likely authors include: Austen, Dickens, Brontë, Eliot, Hardy, Conrad.

ENGL 3702 Desire and Cinema (also COML/FGSS 3702) (LA-AS)
Spring. 4 credits. Letter grade only. E. Hanson.
“The pleasure of the text,” Roland Barthes writes, “is that moment when my body pursues its own ideas—for my body does not have the same ideas I do.” What is this eroticism of the text, and what has it been up to these days in the cinema? This course is a survey of the sensual pleasures of contemporary cinema, and a survey also of theories of sexuality and visuality. We will explore recent work by filmmakers such as Pedro Almodóvar, Olivier Assayas, Catherine Breillat, Atom Egoyan, John Cameron Mitchell, Claire Denis, Peter Greenaway, Michael Haneke, Todd Haynes, Abbas Kiarostami, Stanley Kubrick, David Lynch, Gaspar Noé, Gus Van Sant, and Wong Kar-wai.

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 3730 Weird Science, Hard Poems (LA-AS)
Fall. 4 credits. L. Van Cleef-Steфанau.
Science and poetry seem to some strange bedfellows. Are they and should they be? In the introduction to an anthology of poems written about science and math, Kurt Brown writes, “If science and art have anything in common it exists in the resources of the human brain and our ability to create something unforeseen and revolutionary out of our dreams.” What are the implications, philosophical, cultural, and otherwise in tearing down the walls between science and poetry? Is there revolutionary potential in a marriage between them? For whom? What are the historical arguments for and against such separation? Where can cross-pollination between science or math and creative arts lead us?

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)

ENGL 3790 Reading Nabokov (also RUSSL 3385) (LA-AS)
Fall. 4 credits. For description, see RUSSL 3385.

ENGL 3800 Time Sensitive: Poets of the Last 10 Minutes (LA-AS)

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 3950 Consuming Passions: Media, Space, and the Body (also FGS 3590)
Spring. 3 credits. J. Juffer. For description, see FGS 3590.

ENGL 3970 Policing and Prisons in American Culture (also AMST 3970) (CA-AS)

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. M. P. Brady.

This course will explore Latino/a cultural work including music, film, web sites, comics, television, lowriders, and art. We will consider how this work emerges in the context of U.S. engagements with Latin America and in the context of struggles for social and economic equality among ethnic groups in the U.S. We will also study the relationship between cultural production, representation, and public policy. U.S. Latino/a history is strongly recommended as a prerequisite, but not required.

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. S. Mohanty.
What can literary works, especially novels, tell us about moral issues? Should they be seen as suggesting a form of moral inquiry similar to the kind of philosophical discussion we get in, say, Aristotle’s Nicomachean Ethics? Can reading philosophical works in ethics together with novels that deal with similar themes help us understand these themes better? This course is an attempt to answer these questions. We will read selections from Aristotle, Kant, Marx, and Nietzsche, and use these works to help us understand the nature of moral inquiry in novels like Eliot’s Middlemarch, Coetzee’s Disgrace, Morrison’s Beloved, Woolf’s Mrs. Dalloway, Conrad’s Heart of Darkness, and Achebe’s Things Fall Apart. Other writers we will most probably read include Nadine Gordimer, Doris Lessing, and Kazuo Ishiguro.

ENGL 4030 Advanced Seminar in Poetry: A. R. Ammons (LA-AS)
Fall. 4 credits. R. Gilbert.
A close study of the works and career of the late American poet and Cornell professor A. R. Ammons. We will consider all of Ammons’s published books, as well as unpublished materials housed in the Kroch Manuscript collection. Particular attention will be given to the following topics: shifting levels of tone and diction in his poetry, from the sublime to the bawdy; the special role of scientific language and knowledge in his work; recurring themes of one vs. many and center vs. periphery; his employment of a kind of philosophical discussion similar to the book-length opus; his connection to the culture and landscape of the South; his critical reception and its effects on his writing. Three essays, one in-class presentation.

ENGL 4040 Paleography, Bibliography, and Reception History (also ENGL 4040) (LA-AS)

ENGL 4050 The Politics of Contemporary Criticism (LA-AS)

ENGL 4070 Elements, Atlanticisms, Ecologies (also SHUM 4817)
Fall. 4 credits. M. Allawiwa. For description, see SHUM 4817.
ENGL 4071 Literature of Maritime Empire (also SHUM 4818) 
Fall. 4 credits. S. Baker. 
For description, see SHUM 4818.

ENGL 4100 The Roots of Buffy the Vampire Slayer: Folklore and Medieval Romance 
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. 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. T. Hill. Next offered 2010–2011.

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 2009–2010. 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. This seminar will explore and write about manuscripts, handwriting, books, printers, and more general issues impinging on these during the formative period of modern English culture—from Chaucer’s period through the Renaissance. You will study and transcribe old handwriting, learn to describe manuscripts and incunables, and explore how these things matter to literary and cultural history. As talking points for the class we will use the textual evidence and history of Chaucer’s Wife of Bath’s Prologue, and the textual evidence and history of Shakespeare’s Hamlet; around those, we will do regular exercises while working on independent projects. The final paper will be a 20 page discussion of and partial critical edition of a particular work.

ENGL 4190 The Old English Laws and Their Politico-Cultural Context (also ENGL 6090, HIST 4691/6691) # (CA-AS) 
Fall. 4 credits. Next offered 2009–2010. P. Hyams and T. Hill.

ENGL 4210 Shakespeare in (Con)Text (also THETR 4460, VSST 4546) # (LA-AS) 
Fall. 4 credits. B. Levitt. 
For description, see THETR 4460.

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’s Sonnets and Narrative Poems # (LA-AS) 
Spring. 4 credits. R. Kalas. A course on Shakespeare’s poetry with an emphasis on critical approaches and research methods. Our reading will take us through all of Shakespeare’s poetic works (in fact, we’ll read the Sonnets twice). We will also study key moments in the reception history of the poems, ending with a survey of current criticism. Requirements will include two short papers and a final research paper.

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) 

ENGL 4310 Defoe and His Contemporaries 
Spring. 4 credits. N. Saccamano. This course will examine a broad selection of the poetry, novels, and journalism of Daniel Defoe in relation to other writers in the early eighteenth century. The multidisciplinary diversity of Defoe’s work will allow us to investigate the connection of literature with economics and politics and, as we read some of his contemporaries, we will furnish us with a rich understanding of 18th-century culture in general. Topics will include: newspapers and novels as “modern” genres; intellectual property and the legality of authorship; literary and financial speculation; the education of women; religion, satire, and sedition. Other writers will include Joseph Addison, Mary Astell, John Dryden, Eliza Haywood, Jonathan Swift.

ENGL 4321 Telling Fictions (also COML 4321) 
Spring. 4 credits. C. Chase. This course will examine short works of fiction characterized by the fact that they address questions of justice, and will consider why and how it matters that these works are fictions. Beginning with the distinction in Aristotle’s Poetics between tragedy and history, “poetry” in the largest sense—fiction, or literature—has been defined (and justified) as offering truth which is general and fundamental, ultimately of more value in particular historical periods than the merely particular truths provided by history. At the same time, however, “fiction” and literature have been conceived (and suspected) as illusion or lie, as play and the evasion of truth-telling.

ENGL 4440 Romantic Drama (also ENGL 6440, THETR 4440/6440) # (LA-AS) 

ENGL 4441 Text Analysis for Production: How to Get from the Text onto the Stage (also THETR 4450) 
Fall. 4 credits. B. Levitt. For description, see THETR 4450.

ENGL 4500 History of the Book # (LA-AS) 
Spring. 4 credits. R. Kalas. This course will provide an overview of the book as a material and cultural artifact. Focusing on the era of the printed book (post-1450) in Europe and America, we will examine the invention and spread of printing and publishing, and the evolution of book design, illustration, and binding. The course will place an emphasis on practical tools for the identification and analysis of books and other printed artifacts, especially for literary students. Investigations and assignments will be built around hands-on interaction with examples of Cornell Library’s rare books, manuscripts, and related archival material. This course meets in the Carl A. Kroch Library.

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, Helenia 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) # (CA-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) # (LA-AS) 
Fall. 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 Keneally’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 mythopoetic 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 4640) # (LA-AS)
Fall. 4 credits. B. Maxwell.
An American whose life and writing ranged over the globe, Herman Melville (in the estimation of E. B. James) "says the tendency of things." Our study of the fiction and poetry will turn on some of those "things" of modernity that most obsessively engaged Melville's representational and critical capacities: slave economy and authority; exterminationist policy directed against American Indians; capitalism; orphanhood and homelessness; imperialism; the attempted occultation of women; the shifting terrain of male comradeship; and the ambivalent resort to religion. We will be interested in testing the premise that Melville charted the fault lines of his world with an "uncrowned" critical acuity unparalleled in United States literature.

ENGL 4601  Riddles of Rhythm (LA-AS)
Spring. 4 credits. D. Fried.
What makes a poem's pulse beat? How do poets shape our responses by ordering words into rhythm? How have poets and readers accounted for the essence and effects of rhythm? Is "free verse" free from rhythm? Does a poet's work have political implications? In exploring these questions and others, we will read a variety of poems from the medieval period to the present and examine a range of accounts of how rhythm works by poets, critics, linguists, and theorists. Students will write short exercises working with poetic rhythm and other formal features of poems, as well as critical essays. Poets such as Shakespeare, Milton, Pope, Tennyson, Whitman, Dickinson, Hopkins, Williams, Plat, and Ammons. No previous study of poetic meter or rhythm is assumed.

ENGL 4610  The American Short Story: Where We've Been, Where We're Going Spring. 4 credits. S. Vaughn.
Although not a survey, this course will look back to the short fiction of those wild men, Poe and Twain, while concentrating on a study of the realisms, super-realisms, fantasies, and mythologies of meter and the ambivalent resort to religion. We will be interested in testing the premise that Melville charted the fault lines of his world with an "uncrowned" critical acuity unparalleled in United States literature.

ENGL 4620  Advanced Seminar in Latin/o Studies: Chicana Feminisms in a Globalizing World (LA-AS)

ENGL 4650  American Violence (LA-AS)

ENGL 4660  James on Film (also THETR 4660) (LA-AS)
Fall. 4 credits. D. Fried.
Study of selected films adapted from the novels of Henry James. Our focus will be on close reading of the novels and detailed analysis of the films as we explore how James's remarkable stories have been retold by filmmakers. Topics will include authorship and authority, point of view, levels of representation, visual and verbal styles, the camera as storyteller, acting and character, literary and filmic tension, and theories of adaptation. Works and films may include Daisy Miller, The Turn of the Screw, The Innocents, Washington Square, The Heiress, The Portrait of a Lady, and The Wings of the Dove.

ENGL 4662  Contemporary U.S. American Indian Poetry (also AMST 4662)
Fall. 4 credits. E. Cheyfitz.
In the United States, contemporary American Indian poetry is exemplary for its combination of formal innovation and acute social vision (the result in part of Indian peoples having resisted and survived an historic genocide). Locating this poetry in the vital energy of distinctive cultural contexts, while understanding it as a part of the ongoing history of Indian/European conflict in the Americas, this course will analyze the work of seven Native poets: Sherman Alexie (Spokane/Coeur D'Alene), Joy Harjo (Muscogee), Linda Hogan (Chickasaw), Adrian C. Louis (Lovedove Paiute), Simon Ortiz (Acoma), Wendy Rose (Hopí/Miwok), and Luci Tapahonso (Navajo).

ENGL 4670  The Paranoid Style in Contemporary American Fiction and Film (LA-AS)

ENGL 4700  Senior Seminar in the Novel: Reading Joyce's Ulysses (LA-AS)
Fall. 4 credits. D. Schwarz.
A thorough episode-by-episode study of the art and meaning of Joyce's masterwork 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 concept of epic, hero, and reader. We shall examine Ulysses as a political novel—specifically, Joyce's response to Yeats and the Celtic Renaissance; Joyce's role in the debate about the direction of Irish politics after Partition; and Joyce's response to British colonial occupation of Ireland. We shall also consider Ulysses as an urban novel in which Bloom, the marginalized Jew and outsider, is symptomatic of the kind of alienation created by urban culture. No previous experience with Joyce is required.

ENGL 4701  Documentary Recording, Writing, and Film (LA-AS)
Fall. 4 credits. J. Braddock.
In this class we will study the way in which innovations in recording technology inspired transformations in the fields of film, sound recording, and especially literature. We will begin by studying a range of documentary films and sound recordings from the 1920s and '30s before moving on to an extensive look at late modernist writers who, in emulation of contemporary filmmakers, photographers, and music anthropologists, adopted for themselves a documentary posture. Texts include the poetry of Pound, Rukeyser, Reznikoff, and Langston Hughes; the criticism and theory of Barthes, Benjamin, Houston Baker and Susan Sontag; and the tape pieces of Steve Reich and the films of the Mayseles brothers. Assignments will include two papers and an independent research or creative project.

ENGL 4725  Advanced Seminar in Postcolonial Literatures: Nation, Exile, and Migration in Postcolonial Literatures
Spring. 4 credits. E. Anker.
While the desire for community is basic to human experience, in practice nationalism quickly grow predatory and exclusionary, producing conditions that compel people into exile or refuge. This seminar explores the related phenomena of national migration in postcolonial writing. How does literature help to create national identity yet also critique forms of extremism? If the novel is often explained as a genre that imagines the nation, how does narrative instead represent displacement and loss of home? While some of our writers will cast immigration in a celebratory light, others depict it as a prolonged exposure to mourning and crisis. Likely writers include: Baraka, Seshoeshoe, Desai, J. McCoetzee, B. W. Yeats, Derek Walcott, Salman Rushdie, Jamaica Kincaid, Tayeb Salih, and Shaym Selvadurai.

ENGL 4740  Advanced Seminar on Major Authors: Hemingway, Fitzgerald, and Faulkner (LA-AS)

ENGL 4750  Advanced Seminar in the 20th Century: Narratives of Loss—AIDS

ENGL 4778  Intersections in Lesbian Fiction (also AMST 4780, FGSS 4778) (LA-AS)

ENGL 4779  Advanced Seminar in American Literature: Visual Culture and Women's Literature (also AMST/FGSS 4790, VISST 4800) (LA-AS)
Fall. 4 credits. S. Samuels.
This course will explore a concern shared by contemporary women writers and artists. In their works, bodily visibility raises questions about sexuality, race, and mother–daughter relations. They also use fictional and visual culture to show ingestion and forced incorporation. For example, many works emphasize scenes of eating and, contrarily, refusing to eat. Texts may include novels by Dorothy Allison, Tsitsi Dangarembga, Edwidge Danticat, Oonya Kempadoo, Marilyn Robinson, and Leslie Marmon Silko. Artists examined may include Renee Cox, Mary Kelly, Shirin Neshat, Jolene Rickard, Cindy Sherman, Sally Mann, Bernie Searle, and Kara Walker. Course requirements: Two class presentations, three essays.

ENGL 4791  Transgender and Transsexuality (also FGSS 4791) (LA-AS)
Fall. 4 credits. M. Raskolnikov.
What is a man? What is a woman? What do the terms "transgender" and "transsexual" mean? How about: drag queen, transvestite, butch, boi, femme, stone femme, tranny-chaser? How do the contemporary proliferation of sexual identities and possibilities transform our understanding of sex, gender, sexuality and the body? This course engages students in current discussions of gender difference and gender identity from
feminist, queer and transgender perspectives. Together, we will examine some queer theory, essays (both academic and personal), novels, films, and possibly some legal and medical writings, trying to keep the really interesting questions wide open. Graduate students as well as undergraduates are welcome to enroll for credit.

**ENGL 4800-4810 Seminar in Writing (LA-AS)**
4800; fall; 4810, spring. 4 credits. For description, see section “Creative Writing.”

**ENGL 4840 Postcolonial Poetry and the Poetics of Relation (also COML 4860, 4350/6850, SPAN 4350/6350 (LA-AS))**
Fall. 4 credits. J. Monroe. For description, see COML 4290.

**ENGL 4860 American Indian Women’s Literature (also AIS 4860) (LA-AS)**

**ENGL 4880 Contemporary Poetry and Poetics (also COML 4860) (LA-AS)**
Spring. 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.

**Sec. 1: Gender, Memory and History in 20th Century Fiction (also FGSS 4910)**
K. McCullough.
This course will investigate the narrative uses of memory in the history of the United States, focusing particularly on the impact of gender on these representations. How do U.S. writers use history in their fiction, and to what ends? What are the effects on drawing on received historical narratives? What are the effects of constructing one’s own history to fill a void in the received historical narrative? To what extent is history—personal or public—produced by memory and how are personal and public histories connected? Authors under consideration may include: Julia Alvarez, L. Cao, Michelle Cliff, Cristina Garcia, Jewelle Gomez, Harriet Jacobs, Gayl Jones, Maxine Hong Kingston, Lydia Kwa, Achy Obejas, and Danzy Senna.

**Sec. 2: Post 9/11 Literature**
E. Anker.
This course explores the geopolitical landscape of the post-9/11 world through the lens of recent literature. Our readings will begin with writers who reimagine the spectacular event-ness of terrorism and its aftermath—Ian McEwan, Jonathan Safran Foer, and Cormac McCarthy—although often by transposing 9/11’s fear and sense of apocalypse onto other contexts. We will also examine literature, such as Monica Ali’s Brick Lane and Mohsin Hamid’s The Reluctant Fundamentalist, that interrogates the “clash of civilizations” model for explaining the tensions of 9/11 crystallized. Finally, the course will conclude with texts that anticipate and prepare the post-9/11 world and its crises, thus problematizing its very uniqueness and exceptionality. Additional writers will likely include: Tony Kushner, J. M. Coetzee, Ciarán Carson, and Arundhati Roy.

**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.

**Sec. 1: Reading Utopian Fiction: Thomas More to Philip K. Dick**
J. Mann.
This course focuses on the genre of utopia in its early modern and postmodern incarnations. Beginning with Thomas More’s Utopia, we will explore how world-making fictions emerged in the 16th century in response to both European political upheaval and New World exploration. In the second half of the course, we will consider how contemporary science fiction reworks the genre of utopia, particularly in its seemingly paradoxical emphasis on both fantasy and realism. Readings will include Bacon’s New Atlantis, Campanella’s City of the Sun, Godwin’s Man on the Moon, Cavendish’s Blazing World, LeGuin’s Left Hand of Darkness, Piercy’s Woman on the Edge of Time, the movie Blade Runner, and Neal Stephenson’s Snow Crash. We may also read dystopias such as Gulliver’s Travels and Nineteen Eighty-Four.

**Sec. 2: Formalist Analysis of Poetry and Prose**
F. Bogel.
Formalist criticism made its first significant appearance in England and America in the 1920s and 1930s 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.

**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.
ENGL 6611 What is a Just Society?
Native American Philosophies and the Limits of Capitalism’s Imagination (also AMST 6611)
E. Cheyfitz.

ENGL 6631 American Poetry: 1955–1980 (also AMST 6631)
R. Gilberth.

ENGL 6690 Gift and Contract in the 19th-Century United States: Social and Sexual Constructions of Whiteness, Ethnicity, and Race (also AMST/FGSS 6690)
S. Samuels.

ENGL 6739 Agamben and Deconstruction
K. Atell.

ENGL 6741 Collaboration in Modernist Literature and Culture
J. Braddock.

ENGL 6791 Acoustic Horizons
T. Murray.

ENGL 6920 Neoformalist Theory and Practice
F. Bogel.

ENGL 6951 Postcolonial Literature and Theory
S. Mohanty.

ENGL 7100 The Exeter Book
T. Hill and S. Zacher.

ENGL 7810 M.F.A. Seminar: Poetry
A. Fulton.

ENGL 7811 M.F.A. Seminar: Fiction
M. McCoy.

ENGL 7850 Reading for Writers
L. Van Clief-Stefanon.

ENGLISH AS A SECOND LANGUAGE
See “English for Academic Purposes.”

ENGLISH FOR ACADEMIC PURPOSES
D. Campbell, director; S. Schaffzin, I. Arnesen, P. Kershaw
Note: Courses and credits do not count toward the A.B. degree.

ENGLF 1005 English as a Second Language
Fall. 4 credits. Prerequisite: placement by exam. Staff.
All-skills course emphasizing listening and speaking, with some writing practice. Students also meet individually with the instructor.

ENGLF 1006 English as a Second Language
Spring. 3 credits. Prerequisite: ENGLF 1005 or placement by exam. Staff.
Writing course for those who have completed ENGLF 1005 and need further practice, or for those who place into the course. Individual conferences are also included.

ENGLF 1009 English as a Second Language
Fall or spring. 1 credit. Prerequisite: permission of instructor. Staff.
Practice in classroom speaking and in informal conversational English techniques for gaining information. Students also practice giving informal presentations. Individual conferences with the instructor supplement class work.

ENGL 1010 English as a Second Language
Spring. 1 credit. Prerequisite: permission of instructor. Staff.
Practice in academic speaking. Formal classroom discussion techniques and presentation of information to a group. Presentations are videotaped and reviewed with the instructor. Individual conferences supplement class work.

ENGL 1011 English as a Second Language
Fall, spring, or summer. 3 credits. Prerequisite: placement by exam. Staff.
Academic writing with emphasis on improving organization, grammar, vocabulary, and style through the writing and revision of short papers relevant to students’ fields. Frequent individual conferences supplement class work.

ENGL 1012 English as a Second Language
Spring. 3 credits. Limited to 12 students on first-come, first-served basis. Prerequisite: permission of instructor. Staff.
Research paper writing. For the major writing assignment of this course, students must have a real project that is required for their graduate work. This can be a thesis proposal; a pre-thesis; part of a thesis, such as the literature review or discussion section; a paper for another course or a series of shorter papers (by permission of the other instructor); or a paper for publication. Time limitations make it difficult to deal with work over 20 pages in length. Course work involves practice in paraphrase, summary, the production of cohesive, coherent prose, vocabulary use, and grammatical structure. Frequent individual conferences are a necessary part of the course. Separate sections for social sciences/humanities and for science/technology.

ENGL 1013 Written English for Non-Native Speakers
Spring. 3 credits. Prerequisite: permission of instructor. Staff.
Designed for those whose writing fluency is sufficient for them to carry on regular academic work but who want to refine and develop their ability to express themselves clearly and effectively. Individual conferences supplement class work.

First-Year Writing Seminar

ENGLB 1115–1116 English for Later Bilinguals
1115, fall or summer; 1116, spring 3 credits. D. Campbell.
For description, see First-Year Writing Program brochure.

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 two out of five interdisciplinary core courses:
   ANTHR 4851 Europe: Post-Socialist Capitalism
   Fall. 4 credits. J. Rigi.
   COML 3630 The European Novel
   Fall. 4 credits. J. Rig.
   GOVT/SOC 3413 Modern European Society and Politics
   Fall. 4 credits. S. Van Morgan.
   IRLIC 4330 Politics of the Global North (also GOVT 3303)
   Fall, summer. 4 credits. L. Turner.
   NES 4738 Imagining the Mediterranean
   Spring. 4 credits. G. Holst-Warhaft.

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. Two 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 completing a research project 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 course (GOVT 4313/4320), 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.

Departmental advisors include D. Greenwood (anthropology); C. Otto (architecture); S. Christopherson (city and regional planning); G. Fields (economics); D. Schwarz (English); A. Schwarz (German studies); S. Tarrow...
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 neither neutral nor, or, 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 Studies 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: science, empire, 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 3.5 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 Studies 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 LBG Undergraduate Minor**

LGSS serves as home to the Lesbian, Bisexual, & Gay Studies (LBG) Program, which offers an undergraduate minor as well as a graduate minor. The LBG undergraduate minor consists of four courses. For a complete listing of all courses that will fulfill this minor please see the LBG 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 K. McCullough
   - 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. Staff.
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 2050 Introduction to World Literature in English (also ENGL 2050)**
Fall. 4 credits. Next offered 2010–2011. Staff.

**FGSS 2090 Seminar in Early American History (also AMST/HIST 2090)**

**FGSS 2120 African American Women: 20th Century (also AMST/HIST 2120)**

**FGSS 2140 Biological Basis of Sex Differences (also BIOP 2140, BSOC 2141)**

**FGSS 2190 Women and Gender in South Asia (also ASIAN 2219, HIST 2190)**

**FGSS 2460 Contemporary Narratives by Latina Writers (also LSP 2460)**
Fall. 3 credits. Next offered 2009–2010. 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)**

**FGSS 2760 Desire (also COML/ENGL 2760, THETR 2780)**

**FGSS 2840 Sex, Gender, and Communication (also COMM 2840)**
Fall. 3 credits. L. Van Buskirk.
For description, see COMM 2840.

**FGSS 3040 Sex, Power, and Politics (also GOVT 3043)**

**FGSS 3070 African American Women in Slavery and Freedom (also AMST/HIST 3030)**
For description, see HIST 3030.

**FGSS 3210 Sex and Gender in Cross-Cultural Perspective (also ANTHR 3421) @ (SBA-AS)**
Fall. 4 credits. Staff.
For description, see ANTHR 3421.

**FGSS 3221 Lives of Scientists and Engineers (also STS 3221)**
Spring. 4 credits. M. Rossister.
For description, see STS 3221.

**FGSS 3250 Queer Performance (also THETR 3260)**

**FGSS 3440 Male and Female in Chinese Culture and Society (also ANTHR 3554)**

**FGSS 3450 American Film**

**FGSS 3470 Asian American Women's History (also AAS/AMST/HIST 3470)**

**FGSS 3480 Studies in Women's Literature (also ENGL 3480) (LA-AS)**
Spring. 4 credits. K. McCullough.
For description, see ENGL 3480.

**FGSS 3500 Contemporary Issues in Women's Health (also PAM 3500)**

**FGSS 3530 Monsters A–Z (Aristotle–X–files) (also COML/FREN 3530) # (CA-AS)**
Spring. 4 credits. K. Long.
For description, see FREN 3530.

**FGSS 3550 Decadence (also ENGL 3550)**

**FGSS 3580 Theorizing Gender and Race in Asian Histories and Literatures (also ASIAN 3388/6688, COML 3980/6680)**

**FGSS 3590 Consuming Passions: Media, Space, and the Body (also ENGL 3590)**
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 affects 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 3650) (SBA-AS)**
Fall. 3 credits. L. Benecia.
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)**

**FGSS 3680 Marriage and Sexuality in Medieval Europe (also HIST/RELS 3680)**

**FGSS 3690 Fast-Talking Dames and Sad Ladies (also ENGL/FILM 3690) (LA-AS)**
Fall. 4 credits. L. Bogel.
For description, see ENGL 3690.

**FGSS 3700/6700 Gender and Age in Archeology (also ANTH/ARKEO 3268/6268)**

**FGSS 3702 Desire and Cinema (also COML/ENGL 3702) (LA-AS)**
Spring. 4 credits. E. Hanson.
For description, see ENGL 3702.

**FGSS 3850 Gender and Sexual Minorities (also HD 3840)**
Fall. 3 credits. K. Cohen.
For description, see HD 3840.

**FGSS 3990 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. 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. R. Prentice.
For description, see STS 4021.

**FGSS 4040 Women Artists (also ARTH 4610)**

**FGSS 4060 The Culture of Lives (also ANTH/R 4406) @ (CA)**

**FGSS 4100 Health and Survival Inequalities (also DSOC 4100, SOC 4100)**
Fall. 4 credits. A. Basu.
For description, see DSOC 4100.

**FGSS 4110/6110 Seminar:Devolution and Privatization: Challenges for Urban Public Management (also AEM 4330/6330, CRP 4120/6120)**
[FGSS 4140 Bodies in the Middle Ages: Embodiment, Incarnation, Performance (also ENGL 4140)]

[FGSS 4160 Gender and Sex in South East Asia (also ASIAN 4416, HIST 4160/6160)]

[FGSS 4210 Theories of Reproduction (also DSOC/SOC 4210) (SBA-AS)]
Spring. 4 credits. A. Busu. For description, see DSOC 4210.

[FGSS 4220 New York Women (also HIST 4451, STS 4421)]

[FGSS 4231 Gender and Technology (also BSOC/HIST/STS 4231) (HA-AS)]
Spring. 4 credits. S. Pritchard. For description, see STS 4231.

[FGSS 4270 Parody (also THETR 4200/6200)]

[FGSS 4420 Gossip (also ENGL 4640, FGSS 4620, THETR 4440/6440)]

[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)]

[FGSS 4460 Women in the Economy (also ILRLE 4450, ECON 4570)]
For description, see ILRLE 4450.

[FGSS 4480 Global Perspectives on Violence against Women (also PAM 4440)]
Spring. 3 credits. A. Parrot. For description, see PAM 4440.

[FGSS 4510 Women in Italian Renaissance Art (also ARTH 4450) # (HA-AS)]
Spring. 4 credits. C. Lazzaro. For description, see ARTH 4450.

[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)]

[FGSS 4630 Feminist Theory/Law & Society (also AMST 4590, GOVT 4635)]

[FGSS 4640 Women in the Modern Middle East (also HIST/NEI 4642)]
Spring. 4 credits. Z. Fahmy. For description, see NES 4642.
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, 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
complete, placement into GERST 1230 or
2000
**Intermediate level:** GERST 2000, 2020, 2040,
and 2060
**Advanced level:** GERST 3010, 3020, 3060,
3070, 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, an
APL 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
d 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),
early in the fall semester.

**The Majors**

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.

**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

**GERMAN STUDIES**

L. Adelson; C. Alin (Swedish); B. Buettner,
associate language program director; P. Golgen,
director of graduate studies; A. Groos;
P. U. Hohendahl; C. Hosa (Dutch);
G. Lischke, language program director and
director of undergraduate studies; B. Martin;
G. Matthias; D. McBride; P. McBride; D. Reese;
A. Schwarz, department chair; G. Waite.

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,
or a double major 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
2000 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

**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.”

**ARTS AND SCIENCES - 2008-2009**

[FGSS 7620 Sexuality and the Law (also
FGSS 4610, 7625, GOVT 4625)]
A. M. Smith.]
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 Culture

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 570. 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. G. Lischke, 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. G. Lischke. 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 written and oral 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. Prerequisite: GERST 1230 or LPG 56–64 or SAT II 590–680, or placement exam. P. Gilgen. 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 written and oral 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 2020 Literary Texts and Contexts (LA-AS)

Spring. 3 credits. Prerequisite: GERST 2000 or equivalent or placement exam. Taught 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, Dürenmatt, Schümann, 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 student 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, G. Matthias. 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 system 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 fur den Beruf" is offered.

GERST 3010 Scenes of the Crime: German Mystery and Detective Fiction (LA-AS)

Fall. 4 credits. 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. P. Gilgen. 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, Dürenmatt, Schatten, Süsskind, Handke, Oren, 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 spelling and writing skills. We will focus 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 3200 After the Fires: Divided Germany 1945-1989 (CA-AS)]**
Spring. 4 credits. Satisfies Option 1.
Prerequisite: GERST 2020, 2040 or equivalent or placement exam, permission of instructor. Taught in German. Next offered 2010–2011. L. Adelson.

**GERST 3250 The Age of Goethe # (LA-AS)**
Fall. 4 credits. Satisfies Option 1.
Prerequisite: any 3000-level German course or permission of instructor. Taught in German. A. Grooss.
This course provides an introduction to literary and philosophical texts of the Age of Goethe, ranging from the late Enlightenment through Romanticism. After initial readings on the Enlightenment by Lessing, Kant, and Schiller, readings/discussions will explore major literary representatives of the Sturm-und-Drang and Weimar periods, such as Goethe’s Werther and Faust I (selections); Schiller’s Kabale und Liebe and Maria Stuart; and a wide selection of poetry. Readings in Romantic literature will include narratives by writers such as Kleist, E. T. A. Hoffmann, and Tieck, as well as poetry by Holderlin, Novalis, Brentano, and Eichendorff.

**GERST 3270 Too Much to See: German Literary and Visual Cultures, 1900–1933 (CA-AS)**
Fall. 4 credits. Satisfies Option 1.
Prerequisite: Any 3000-level German course or permission of instructor. Taught in German. P. McBride.
Are we drowning in images? This is a question critics and intellectuals in Western and Central Europe insistently posed at the beginning of the 20th century as they were reacting to the momentous cultural changes brought about by the rise of new media and forms of communication that rely primarily on the visual—from photography to film, from advertising to new typographical styles. "Stop reading! Look!" A German cultural critic recommended in the 1920s. This became the rallying cry of avant-garde artists eager to leave behind traditional cultural modes based on writing and reading and embrace a modern experience permeated by images. How does a visual culture shape our ways of perceiving ourselves and our identity as individuals? What is the place of traditional literacy in this transformed world? Are the issues raised by a new dominance of the visual still helpful in navigating our contemporary cultural environments? These are some of the questions we will consider as we explore the visual revolution that transformed the culture of the German-speaking countries in the first half of the 20th century.

**GERST 4100 Literature of the Fantastic (LA-AS)**
Spring. 4 credits. Satisfies Option 1.
Prerequisites: adequate command of German; any 3000-level course taught in German, or equivalent, or permission of instructor. Required readings and discussion in German. A. Schwarz.
When and why does "the family" become an object of literature? What can we find out about sibling relationships, concepts of parenthood, and questions of ancestry and genealogy when they are part of a plot in novels, novellas, or short stories? In this course we shall trace the history of "family" as a literary topic and investigate the various forms of family literature in a single country that has presented its story to us throughout three centuries. Topics of discussion will include: When did the "mother" take on the central role of education? When did the "father" take on the roles of protector or antagonist? When did literature decide to portray ancestors as ghosts? How does literature portray sibling rivalry and family crimes? The course will feature literary works and texts from anthropology, psychoanalysis, history, and law. Authors include: Goethe, Schiller, Hoffmann, Keller, Stifter, Kleist, the Brothers Grimm, the Brothers Mann, Kafka, Bernhard, Freud, and others.

Kafka, among others, we will examine how the themes of the fantastic and the supernatural are codified in response to social, political, and cultural developments. In probing Tzvetan Todorov’s influential thesis about the rise and exhaustion of the fantastic tale in the course of the 19th century, we will analyze the modes of writing and representation associated with this genre, as well as realignments it produced in the relations between literature and other cognitive discourses, particularly science and philosophy.

**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**

**GERST 4420 Changing Worlds: Migration, Minorities, and German Literature (LA-AS)**

**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 2009–2010. A. Schwarz.

Courses conducted in English

It may be possible to arrange a German section for courses conducted in English, either informally or formally (for credit). Students are encouraged to discuss this possibility with instructors.

**GERST 3550 Political Theory and Cinema (also COML 3300, FILM 3290, GOVT 3705) (CA-AS)**

**GERST 3600 Words and Music (also MUSIC 2245) # (LA-AS)**

**GERST 3740 Opera and Culture (also MUSIC 3223) # (LA-AS)**
Spring. 4 credits. Prerequisite: Any 3-credit music course or proficiency in German or Italian. A section in German will be available for 1 extra credit. A. Grooss.
This course is designed to explore interrelationships between opera and cultural practice, using examples principally from the German and Italian repertories (e.g., Mozart, Wagner, Verdi, Puccini, Strauss). Lectures and discussions will examine operatic representations of central issues in the emergence of modern culture in the late 18th and 19th centuries: politics and national identity, issues of gender and sexuality, orientalism, representations of madness and disease. Depending on student interest, a final segment of the semester may extend our focus into 20th-century opera or other media such as film and theater.
subterranean, influence on Marx, Nietzsche, and Freud, among others. Our seminar aims: (1) to introduce Spinoza in his own words; (2) to trace his legacy, beginning with the “Spinoza controversy” from the seventeenth century to the so-called New Spinozists (Albicat, Althusser, Bloch, Desuzze, Giancotti, Iriarag, Karatani, Macherey, Negri), some of whom have been using Spinoza to develop non- or even anti-Kantian ways of thinking and acting. We will also take seriously Leo Strauss’s reading of Spinoza. If “The new world system, the ultimate third stage of capitalism is for us the absent totality, Spinoza’s God or Nature, the ultimate (indeed perhaps the only) referent, the true ground of Being in our time” (Jameson), we will need to read with particular care Spinoza’s *Emendation of the Intellect, Ethics, Theologico-Political Treatise, Political Treatise, and Corroll. 4 credits, and the anthology *The New Spinoza* (ed. Montag and Stolze).

**GERST 4150** Marx, Freud, Nietzsche (also COML 4250, GOVT 4735) (LA-AS)


**GERST 4200** Faust: Close Reading (LA-AS)


**GERST 4240** The Totalitarian Order: Vision and Critique (also GOVT 4255) (CA-AS)


**GERST 4260** The Animal (also COML 4240, ENGL 4260) (CA-AS)


**GERST 4270** Freud and His Commentators (also HIST 4280) (HA-AS)

Fall. 4 credits. Limited to 15 students. C. Robics.

For description, see HIST 4280.

**GERST 4280** Genius and Madness in German Literature (LA-AS)

Next offered 2009–2010. Offered as GERST 2250 in summer 2008 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 COML 4050, THETR 4310/6310) (LA-AS)

Fall. 4 credits. 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 2009–2010. V. Caron.

**GERST 4410** Introduction to Germanic Linguistics (also LING 4441) (HA-AS)

Spring. 4 credits. W. Harbert.

For description, see LING 4441.

**GERST 4510-4520** Independent Study (4510) Fall, 4 credits; (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)

Fall. 4 credits. D. Schwartz.

For description, see ENGL 4580.

**GERST 4960** Theorizing the Public Sphere


**Graduate Courses**

**Note:** For complete descriptions of courses numbered 6000 or above consult the appropriate instructor.

**GERST 6030** Literature of Fascism and Anti-asivism

Fall. 4 credits. P. McBride.

This course will explore the multiple cultural contexts of the Third Reich by drawing on a variety of media (literature, film, architecture, and the visual arts) and disciplinary perspectives (literary criticism, political and social theory). Questions we will discuss include the nature of the style(s) or cultural project(s) of Nazi official culture; the relationship between high art and mass culture; the articulation of gender, class, and racist dimensions in cultural production and reception. Special attention will be devoted to manifestations of opposition and resistance that surfaced in the literature, arts, and mass culture of the period; the culture of the Jewish Community of Germany and Austria; and the cultural production of the concentration and death camps. Possible readings include texts by Schmitt, Grimm, Benn, Heidegger, Jünger, Bergengruen, Klüger, Hitler, Berens-Totenohl, Benjamin, Adorno.

**GERST 6131** German Philosophical Texts (also PHIL 6030)

Fall and spring. 1–4 credits. Variable. A. Chignell.

For description, see PHIL 6030.

**GERST 6140** The Man without Qualities and Theories of Narration (also COML 6141)

Spring. 4 credits. P. McBride.

This seminar will focus on Robert Musil’s torso *The Man without Qualities*. Our discussion of the novel will unfold along two tracks. On the one hand, we will delve into essays and notebooks to situate his highly reflexive project within contemporary attempts at overcoming a realist narrative paradigm in the experiments of Symbolism, Expressionism, and, after World War I, the documentary writing of the New Objectivity. Musil’s endeavor will thus provide a prism for interrogating key preoccupations that are conventionally grouped under the label of modernism: estrangement as a privileged mode of aesthetic experience; the relation of language, thought, and reason; the death of the subject; the incompleteness of narrative; the entwinement of history and storytelling; irony, essayism, and mysticism as circumscribing the ethical and political dimensions of writing. A second thread we will pursue concerns the ways in which Musil’s novel resonates with a variety of influential attempts at conceptualizing narrative in our time. Possible readings will include texts by Adorno, Auerbach, Bakhtin, Bal, Benjamin, Blanchot, Bohrer, de Man, Eco, Genette, Kristeva, Lyotard, Moretti, and Todorov.

**GERST 6150** Jews in German Culture Since 1945

GERST 6180 Spaces of Literature

GERST 6180 The Science of the Experience of Consciousness: Hegel's Phenomenology of Spirit (and Beyond) (also COML 6180)

GERST 6200 Faust: Close Reading (also GERST 4200)

GERST 6220 Cultural Pessimism and the Fin-de-Siècle

GERST 6270 Baroque

GERST 6290 The Enlightenment
Spring. 4 credits. Anchor course.

GERST 6300 Classicism and Idealism

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

GERST 6360 Kleist and Kafka: Prose Works

GERST 6370 19th-Century Fiction: The Realist Project
Spring. 4 credits. Anchor course.

GERST 6380 Readings of Recollection (also COML 6010)

GERST 6390 Walter Benjamin: Constellations of Thought

GERST 6470 German Literature from 1740 to 1815
Fall. 4 credits. Prerequisite: reading knowledge of German. L. Adelson.

This seminar/anchor course will focus on German literature during the period of the cold war between 1949 and 1989. The point of the course will be to trace major themes and styles in German-speaking literature, East and West, in light of contemporaneous events of broad cultural and political significance. While individual texts will be examined within their specific historical (temporal, geopolitical, aesthetic) contexts, the course will also be organized comparatively around critical debates concerning such topics as fictional representations of the immediate past, attempts by minority/majority voices to challenge and change the canon, writing and social change; questions concerning a national cultural identity, the politics of modernity and postmodernism; and others. Readings will be selected from authors such as W. Borchert, H. Böll, G. Grass, I. Bachmann, W. Koeppen, A. Andersch, P. Handke, F. Dürrenmatt, C. Wolf, P. Weiss, H. Müller, V. Braun, C. Hein, L. Morgner, J. Becker, H. Enzensberger, A. Kluge, P. Schneider, B. Strauss, A. Duden, M. Maron, and E. Ozdamar.

GERST 6500 Culture in the Weimar Period
Fall. 4 credits. Next offered 2009–2010.

GERST 6530 Opera

GERST 6560 Aesthetic Theory: The End of Art (also ARTH 4047, COML 6560, VISST 4456)
Spring. 4 credits. P. Gilgen.

GERST 6580 Old High German, Old Saxon (also LING 6646)

GERST 6600 Visual Ideology (also ARTH/ VISST 6060, COML/THETR 6600)
Fall. 4 credits. G. Waite.

Some of the most powerful approaches to visual practices have come from outside or from the peripheries of the institution of art history and criticism. This seminar will analyze the interactions between academically sanctioned disciplines (such as iconography and connoisseurship) and innovations coming from psychoanalysis, semiotics, philosophy, phenomenology, sociology, literary theory, mass media criticism, feminism, and Marxism. We will try especially to develop: (1) a general theory of "visual ideology" (the gender, social, racial, and class determinations on the production, consumption, and appropriation of visual artifacts under modern and postmodern conditions); and (2) contemporary theoretical practices that articulate these determinations. Examples will be drawn from the history of oil painting, architecture, city planning, photography, film, and other mass media.

GERST 6620 Reassembling Culture: Montage and Collage in Weimar Germany

GERST 6630 Nietzsche and Heidegger (also COML 6630)

GERST 6680 Literature and the Uncanny

GERST 6710 Postcolonial Theory and German Studies

GERST 6890 The Aesthetic Theory of Adorno (also COML 689/5590)

GERST 6960 Rites of Contact: Emergent German Literatures and Critical Method (also COML/NEIS 6960)
Spring. 4 credits. L. Adelson.

New forms of German literature have been emerging for decades in the wake of transnational labor migration, and these innovations have only intensified since 1989. Departing from an anachronistic sociological model that still interprets this literature as a model that still interprets this literature as a plea for compassionate intercultural dialogue, this course juxtaposes prose fiction about cultural contact and critical theories of difference with two primary goals in mind. 1) Students will be introduced to representative examples of contemporary German literatures of migration, an aesthetic phenomenon whose scope, significance, and sophistication have grown much faster than the critical resources used to address it. 2) Critical modes of conceptualizing cultural contact in Germany will be explored and compared, methodologically in relation to each other and analytically in tension with the literary field. A primary focus on German literature of Turkish migration will be complemented by literary and analytical readings reflecting other transnational phenomena such as postsocialism, postcolonialism, and globalization. Literary selections include works by authors such as Aras Ören, Emine Sevgi Ozdamar, Zafer Senocak, Kemal Kurt, Feridun Zaimoglu, Doron Rabinovici, Barbara Honigmann, Maxim Biller, TORKAN, Sherko Fatah, Galsan Tschinag, Yoko Tawada, José Olivé, Zsuzska Bánk, Christoph Hein, and Urs Widmer. Course participants must possess
good reading knowledge of German and English.

GERST 7530–7540 Tutorial in German Literature
7530, fall; 7540, spring. 1–4 credits each semester. Prerequisite: permission of instructor.

Dutch

DUTC 1210–1220 Elementary Dutch
1210, fall; 1220, 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.

DUTC 2030 Intermediate Composition
Fall. 3 credits. Satisfies Option 1. Prerequisite: DUTC 1220 or permission of instructor. Offered in Dutch. C. Hosea. Improved control of Dutch grammatical structures and vocabulary through guided composition, discussions, compositions, reading, and film, drawing on all Dutch-speaking cultures.

DUTC 2050 Dutch Culture and Society (CA-AS)
Fall. 3 credits. M. Briggs. The Netherlands is known as the country of tulips, cheese, and windmills as well as being infamous for its liberal policies regarding legalized soft drugs, prostitution, and gay marriage. What is the truth behind these holiday snapshots and the superficial image of a liberal party spot? How did this tiny country with a landmass similar to the size of Maryland once rule the seas, how did it come to stand at the cradle of the State of New York, and how does it remain a major player in European affairs and world economics? During this course we will discuss various aspects of Dutch history, such as the Dutch relationship with the sea, Dutch–American relations, World War II, as well as contemporary and controversial issues such as the role of Islam and integration, the welfare state, and Dutch liberal policies as well as the Netherlandic character of Flanders in neighboring Belgium. Through these studies, we will learn how the history and geography of the Low Countries has influenced its own early and contemporary culture and psyche as well as how it influenced others parts of the world. The course will offer significant moments in Dutch History, its glorious Golden Age, politics, kleinkunst, film and hot-off-the-press current events and more.

DUTC 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 Introductory Swedish
Fall. 4 credits. Intended for students without prior experience in Swedish. C. Alm. Participants gain fundamental Swedish language proficiency and functional communication skills, as well as cultural insights into Sweden and Swedish-speaking contexts. The course covers topics such as introducing oneself and friends, family, housing, travelling, festivities, food, restaurant visits, shopping, clothing, travel, and visiting Sweden. Oral and written expression and skills in listening and reading are developed in an interactive immersion classroom, enriched by a Virtual Textbook, practical activities using current web tools, and additive audio-visual and textual materials. Brief podcasts introduce current Swedish issues, and participants explore Swedish language, culture, and society in guided portfolios.

SWED 1220 Continuing Swedish
Spring 4 credits. Prerequisite: SWED 1210 or equivalent Swedish language background. C. Alm. Participants expand their proficiency in speaking, listening, 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 in theme-based units, participants further enhance their skills of the forms and functions of Swedish at the intermediate to advanced level, while enriching stylistic and expressive variation in their use of Swedish and strengthening their understanding of Sweden and the Scandinavian context. Topics may include Vikings and Norse mythology, the Swedish popular music industry, Sweden and the EU, technology and entrepreneurship in Swedish-speaking contexts, contemporary multicultural Sweden, the history of the Swedish language, and Swedish design and creative expression. An interactive classroom that fully immerses participants in Swedish language skills, studying translation and cultural contexts. The course covers topics such as introducing oneself and friends, family, housing, travelling, festivities, food, restaurant visits, shopping, clothing, travel, and visiting Sweden. Oral and written expression and skills in listening and reading are developed in an interactive immersion classroom, enriched by a Virtual Textbook, practical activities using current web tools, and additive audio-visual and textual materials. Brief podcasts introduce current Swedish issues, and participants explore Swedish language, culture, and society in guided portfolios.

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 and meet 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


Web site: falcon.arts.cornell.edu/Govt

"Government" is what Cornell calls a discipline 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 Professor 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. Students are trained to represent various European states. 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)** Fall and summer. 3 credits. R. Herriges.

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. J. 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. S. Morgan.

For description, see SOC 2220.

**GOVT 2403 China Under Revolution and Reform (also CAPS 2403) @ (SBA-AS)** Fall. 3 credits.

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 (1959–1976), 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 the 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)** 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. G. Rochebouef.

For description, see HIST 2331.

**GOVT 2716 Politics of Violence in 20th-Century Europe (also HIST 2711) (HA-AS)** Spring. 4 credits. H. Case.

For description, see HIST 2711.

**GOVT 2747 History of Modern Middle East in 19–20th Century (also HIST/PHIL 2674 @ (CA-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. Next offered 2009–2010. 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 2847 Global Thinking (also PHIL 1940) @ (KCM-AS)** Fall. 4 credits. R. Miller.

For description, see PHIL 1940.


Analyzing a variety of movements from the late 19th century to the present, this course seeks answers to the following questions: What social and political conditions gave rise to these movements? What determined success or failure (and how should those terms be defined)? How do social movements affect political processes and institutions (and vice versa)? What is their legacy in politics and in patterns of social interaction? The major movements analyzed are populism; progressivism; labor; socialism; women’s suffrage; the contemporary gender equality movement; protest movements of the 1960s; civil rights; SDS and antiracism movements of the
GOVT 3031 Imagining America (also AMST 3031, COML 3410, FRILIT 3240) (CA-AS)
Fall. 4 credits. Next offered 2009–2010.
D. Rubenstein.

GOVT 3043 Sex, Power, and Politics (also FGSS 3040) (SBA-AS)
S. Martin.

GOVT 3053 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 you will be introduced 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 ponder 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. J. Reppy.
For description, see STS 3911.

GOVT 3111 Urban Politics (also AMST 3111) (SBA-AS)
Fall. 4 credits. M. Shetter.
The major political actors, institutions, and political styles in large American cities: mayors, city councils, bureaucracies, ethnic and racial minorities, urban machine politics and the municipal reform movement. The implications of these political forces for policies pertaining to urban poverty, homelessness, and criminal justice.

GOVT 3128 America's Changing Faces (also AMST 3121)
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)
Spring. 4 credits. Prerequisite: undergraduate standing. A. Riles.
General education course for students at the sophomore and higher levels. Law is presented not as a body of rules but as a set of varied techniques for resolving conflicts and dealing with social problems. The roles of courts, legislatures, and administrative agencies in the legal process is analyzed, considering also the constitutional limits on their power and practical limits of their effectiveness. Assigned readings consist mainly of judicial and administrative decisions, statutes and rules, and commentaries on the legal process. Students are expected to read assigned materials before each class and to be prepared for participation in class discussion. (AM)

GOVT 3141 Prisons (also AMST 3141) (SBA-AS)
Fall, winter, and summer. 4 credits.
M. Katzenstein.
This seminar will look at the politics of incarceration. Why is prison construction a growth industry? What is the role of public policy and of the law in this process of prison expansion? How does race and racism in American society figure in this? Are women's prisons designed to respond to the needs of a "generic-male" prisoner or are they organized around women's needs? Are there "spaces" within the prison (educational programs, libraries, chaplain's offices) that alleviate the grim realities of prison life? We will devote a section of the course to reading about and discussing different forms of political activism on behalf of prison reform. Seminar members should plan on an occasional extra class time, likely to be Wednesday or Thursday evenings, to hear guest speakers and see films. (AM)

GOVT 3150 The American Legal System: Its Nature, Functions, and Institutions
Summer. 4 credits. Offered in New York City. C. Stewart.
This course offers a comprehensive introduction to the American legal system, its roots in natural and common law, the purposes/values it serves (e.g., resolution of private grievances; punishment of offenses against the polity and individuals; preservation, development, and limitation of individual and group rights; and facilitation of commerce and private agreements), and the roles of the judiciary, legislature, and private parties. The course is taught using the Socratic method employed at most U.S. law schools and introduces students to fundamental concepts and techniques used by attorneys and courts in analyzing cases, interpreting statutes, and determining disputes. As in law school, students are expected to read assigned materials before each class meeting and to participate actively in class discussions.

GOVT 3161 The American Presidency (also AMST 3161) (SBA-AS)
Fall. 4 credits. E. Sanders.
This course is designed to provide 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 (SBA-AS)
Fall. 4 credits. Prerequisite: GOVT 1111 or permission of instructor. 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. M. Shetter.
The role of Congress in 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)
M. Jones-Correa.

GOVT 3212 Public Opinion and Representation
Spring. 4 credits. 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 (SBA-AS)
Fall. 4 credits. M. Shetter.
During the last three decades, American citizens have grown increasingly unequal in terms of income and wealth. Can democratic governance survive, in any meaningful way, amid such vast economic inequality? We shall examine this question by examining three major aspects of the American political system: political voice, governance, and public policy. We will also consider the extent to which public policies can mitigate inequality.

GOVT 3259 European Union and Social Model (also ILRIC 3320)
Fall. 4 credits. O. Jacob.
For description, see ILRIC 3320.

GOVT 3293 Comparative Politics of Latin America (also DSOI 3290, LATA 3292) (SBA-AS)
Spring. 4 credits. Knowledge of Spanish or Portuguese is 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 are 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 structure, political 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. 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 Islamic movements 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 3322 Modern European Politics (SBA-AS)
Fall. 4 credits. Next offered 2009–2010.
T. Zittel.
This course offers an introduction into politics and political systems in Western Europe. It starts with a brief history of the consolidation of West European democracies before and after World War II. We then discuss core theoretical concepts guiding the comparative analysis of political systems. The main part of the course will consist of a discussion of the political cultures, parties, electoral systems, and current problems confronting the political systems of Britain, France, Germany, and Italy. Italy and Germany will be treated in depth. Hotly debated issues in European politics will be presented by students in class and in a short research paper, before we conclude with an analysis of the European Union (EU) as political system. (CO/IR)

GOVT 3344 Islamic Politics (also NES 3844) (SBA-AS)
Fall. 4 credits. D. Patel.
This course will examine the relationship between politics and modern Islamic movements. The course investigates Islamic political theory and the evolution of contemporary Islamic movements in the context of anti-colonial struggles, modern nation-state formation, neo-liberal reform, and in relation to forms of political opposition. We will explore 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 3363 Postcommunist Transitions (SBA-AS)]
V. Bunce.
The focus of the course is on political and economic developments since the collapse of communism in the 28 states that make up Eastern Europe and Eurasia. Topics to be addressed include why democracy has developed in some countries, but not others in the region; differences in economic performance across the region; the role of the United States and the European Union in promoting democratic governance. The geographical focus will shift, depending upon the topic at hand.

[GOVT 3383 Comparative Political Economy (SBA-AS)]
C. Way.
Examines the juncture of politics and the economy in the advanced industrial democracies. Why do some countries have large, inclusive welfare states while others have minimal social programs? Is the welfare state in decline, and if so why? What differences does it make for the economy whether parties of the Left or Right govern? Are strong unions bad for the economy, or can they actually boost economic performance? What does increasing globalization of the world economy mean for the constraints and opportunities facing governments in managing the economy and providing social welfare? Are all market economies pretty much the same, or are there varieties of capitalism that differ in important ways—and can they survive in the face of globalization? This course uses a variety of theoretical perspectives to investigate these and other questions, paying particular attention to evaluating the theoretical arguments with both systematic and historical evidence. (CO/IR)

GOVT 3393 Political Economy of Development @ (SBA-AS)
Fall. 4 credits. Next offered 2010–2011.
D. Moehler.

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. T. Zittel.
German unification in 1990 and the accelerating movement toward European integration have created new political conditions for our understanding of German and European politics. The end of the Cold War has brought forth old fears about the domination of Europe by an unpredictable German giant. Alternately, these changes have also fueled new hopes for Germany and Europe as models of democratic pluralism in a more peaceful and prosperous world. This course analyzes the incomplete growth of a new polity in Europe that reflects two kinds of politics: the specter of the “Germanization” of Eastern Europe and the vision of a “Europeanization” of Germany. The course offers a historical analysis of German and European developments since 1945 (Part I) before developing competing realist (Part II), liberal (Part III), and institutionalist (Part IV) interpretations of German and European affairs. (CO/IR)

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 system. 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 considered is 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
Spring. 4 credits. T. Pepinsky.
Contemporary politics in Southeast Asia must be understood in light of colonialism, the nationalist movements that colonial rule in effect produced, and the geopolitics of the Cold War era. Colonial rule defined the territorial boundaries and institutions of the modern state, nationalism provided a new political discourse, and the Cold War influenced the nature of political authority and legitimacy in post-colonial states. This course will consider the importance of these and other themes in relation to processes of state building and democratization in comparative perspective, with special focus on Thailand, Burma, Indonesia, and the Philippines.

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.
used to justify conquests and displacements overviews of native peoples in the countries New Zealand. We will begin with brief United States, as well as the status of...course will consider the possible futures of these "nations within" by considering normative arguments about assimilation, cultural rights, and full sovereign statehood. (PH)

GOVT 3655 Politics and Literature (also AMST 3655) (LA-AS)
Fall. 4 credits. J. Frank.
What is political authority and how is it constituted? How do we judge and act when torn by conflicting obligations? How do political actors in the present negotiate the legacies of past injustice (for example, slavery, colonialism, state violence)? To what extent does the past shape and determine our political present (our sense of self, our relations with others)? And where might we find the cultural resources for resistance and/or political transformation? These are some of the ethical and political questions we will pursue in this course as we study the works of prominent (and diverse) writers of literature. The course will examine the important contributions of literature to the study of politics, and to the formation of a more thoughtful, critical citizenship. (PT)

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. Topics include: theoretical explanations for war, evaluation of the evidence for the various explanations; the impact of nuclear weapons on international politics; ethics and warfare; the uses and limitations of power; international terrorism. (IR)

GOVT 3687 The Causes of War (SBA-AS)
C. Way.
Surveys leading theories of the causes of interstate war—that is, large-scale organized violence between the armed forces of states. Why is war a recurring feature of international politics? Are democracies more peaceful than other types of states, and if so what explains this "democratic peace"? Why do democratic states seem to reward threats to use force by "rallying around the flag" in support of their governments? Does the inexorable pattern of the rise and fall of nations lead to cycles of great power wars throughout history? These and other questions are examined in this survey of theories of war at three levels of analysis: the individual and small groups, domestic politics, and the international system. Topics include: theoretical explanations for war; evaluation of the evidence for the various explanations; the impact of nuclear weapons on international politics; ethics and warfare; the uses and limitations of power; international terrorism. (IR)

GOVT 3698 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 3831 Comparative Foreign Policy
Spring. 4 credits. J. Weeks.
Understanding and explaining foreign policy decision making behavior; (2) to sensitize students to the complex constraints under which foreign policy is made, the margins of choice that statesmen have in shaping policy, and the intended and unintended consequences that a chosen policy has on international as well as domestic life; and (3) to help students develop a critical, in-depth understanding of some of the major policy issues that face the United States today and to encourage them to think creatively about alternatives. (IR)

GOVT 3860 Administrative Law
Fall. 4 credits. W. Poole.
Introduction to the study of the constitutional and statutory constraints on the power of government.
[large versus small, democratic versus authoritarian, industrialized versus developing, etc.] lead to differences in their foreign policies. Another argues that the important differences are not so much between countries as between "issue-areas," for example, military policy versus trade policy. In this course, students will evaluate the competing explanations by looking at a number of aspects of foreign policy—including diplomacy, strategy, economic policy, and alliance policy—in several areas and historical cases. We will attempt to understand why some states are more successful than others in achieving the main goals of foreign policy: security and prosperity.

GOVT 4032 Immigration and Politics Research Seminar (also AMST/LSP 4032) (CA-AS)
Spring. 4 credits. M. Jones-Correa.
Latinos are a greater presence in American society and political life than ever before. Students in this course will explore themes such as immigration, political incorporation, inter-ethnic relations through both extensive readings and use of a unique dataset—the 2006 Latino National Survey, a survey of 8,600 Latino/which includes questions ranging from crime and education to transnationalism and discrimination. Students will be expected to learn and use statistical software to conduct preliminary analyses of these data, and to use these data and other resources to explore original research projects. Prior coursework in American politics is recommended; no prior exposure to statistical software required.

GOVT 4041 American Political Development in the 20th Century (also AMST 4041, AMST/GOVT 6121) (HA-AS)
Fall. 4 credits. E. Sanders.
This course examines the growth and change of the American national state from the early 20th century to the present. It is concerned with the responses of the national government to changes and pressures originating in society, economy and the international distribution of power as well as the state’s effect on society, market and world politics. We will explore pluralist, class-based, state-centered and other approaches in an effort to see which provides a better explanation for the rise (and contraction) of the national state in three main arenas: economic regulation, social welfare and rights; and national security.

GOVT 4051 The Postmodern Presidency: Election 2008 (CA-AS)
Fall. 4 credits. D. Rubenstein.
Examines the presidencies of Reagan, G. H. W. Bush, Clinton, and G. W. Bush in relation to what scholars have called “the postmodern presidency.” While this term has been used by institutionalist students of the presidency as a periodizing hypothesis, this course emphasizes the work of cultural critics and historians. Addresses the slippage between fact and fiction in cinematic and popular representations of the presidency (biography, novels, television). The construction of gender normativity (especially masculinity) is an attendant subtheme. The postmodern presidency is read as a site of political as well as cultural contestation. The larger question of this approach to the presidency concerns the relationship between everyday life practices and citizenship as well as the role of national fantasy in American political culture today. (AM)

GOVT 4061 Politics of Slow-Moving Crisis (also AMST 4061/6161, GOVT 6161) (SBA-AS)

GOVT 4142 Causes and Consequences of U.S. Foreign Policy (also AMST 4141/6142, GOVT 6142) (SBA-AS)
Spring. 4 credits. E. Sanders.
How can we characterize the 20th/21st-century legacy and continuing impact of U.S. foreign policy on the world? What forces—domestic, international, institutional, electoral, economic, cultural, or personal—drive U.S. foreign policy? These are the broad questions to be addressed this semester.

GOVT 4231 The 1960s: Conceptualizing the Future from the Past (also AMST 4231) (CA-AS)
The decade of the 1960s was a genuine sea change in American history. 1968 was its culmination and remains its symbol. Politically it was the end of the great Roosevelt/Revolution and Democratic party hegemony; the end of consensus on rights, the end of liberalism, and the end of world bipolarity. It was also the end of American economic sovereignty. And it was the end of the arts as pure entertainment. Was it the end of everything? What was the response to “1968”? Cultural as well as political and economic phenomena must be explored. The seminar divides neatly and naturally between ends and beginnings. (AM)

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 4264 Social Movements in Latin America (also GOVT 6264) @ (SBA-AS)
This course analyzes different types of historical and contemporary social movements in Latin America. It begins with an overview of class-based labor and peasant movements, including their relationships with populist or leftist political parties. The class will then study revolutionary movements and the social actors that participate within them. The second half of the course will focus on various “new” social movements that have altered the region’s social and political landscape over the past twenty years, including movements organized around gender issues, human rights, environmental protection, shantytown communities, and indigenous rights. Special attention will be given to the construction and transformation of collective identities and new patterns of social protest in response to market globalization in the region.

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 4313 Model European Union I
Fall. 2 credits. Staff.
For description, see GOVT web site.

GOVT 4323 Model European Union II
Spring. 2 credits. Staff.
For description, see GOVT web site.

GOVT 4585 American Political Thought (also AMST 4585, GOVT 6585) (HA-AS)

GOVT 4616 Interpreting Race and Racism: Du Bois (also AMST 4616) (HA-AS)
This seminar is an advanced undergraduate course based on classic and contemporary social and political theory texts. We will explore the historically specific and antagonistic construction of race, and we will focus on the complex and contradictory ways in which racializing formations are defined in terms of class, gender and sexuality. For the spring 2008 version of the course, we will focus on the works of W.E.B. Du Bois. Seminar participants should have already completed GOVT 1651 or GOVT 3191 or equivalent courses in other departments before the course begins. Class size will be limited, and seniors who have satisfied the prerequisite course work will be given priority. To apply for admission, please contact the instructor.

GOVT 4625 Sexuality and the Law (also AMST 4625/6625, FGSS 4610/7620, GOVT 7625) (KCM-AS)
Advanced feminist theory/political theory/ queer theory/legal theory seminar for graduate students and law students. Deals first with theoretical approaches to sexuality that build on and interrogate the popular feminist approach that defines sexuality as a social construction, rather than an expression of a-historical instincts. Explores a series of major legal and political issues: the right to privacy with respect to contraception and abortion; the restriction of abortion rights; the exclusion of homosexual sodomy from the practices protected by the right to privacy; the racial regulation of marriage; same-sex marriage; Pineman’s “sexual family” critique of family law; the moral regulation of poor women in early welfare law; the sexual regulation of poor single mothers in contemporary welfare law; the question of suspect status for lesbians and gay men; and homosexuality and military service. Throughout the course,
students examine the extent to which sexuality is constructed in articulation with gender, class and race differences. The reading list includes theoretical works (Foucault, Butler, Cohen and Martin), Supreme Court decisions, and critical commentaries by feminist legal theorists. (PT)

GOVT 4635 Feminist Theory/Law and Society (also AMST 4365) (CA-AS)
Feminist theory presents unique challenges to the student of politics interested in State structures, legal rights, and public policy. While liberal democratic state theory takes for granted the separation between the “private” and “public” spheres, feminist theory submits that distinction to a thorough interrogation. Feminists also insist that the “personal is political.” An individual woman might decide to use contraception or to practice safer sex in a highly intimate context, but feminist theory brings to light the fact that social movements, cultural trends, changes in the health care field, governmental agencies, and legal doctrine have set the stage for that personal decision.

Feminist theory is therefore situated in a private/public dichotomy that shed new light on some of the most interesting issues in contemporary politics, such as same-sex marriage, abortion, the HIV and AIDS epidemic, stem cell research, access to health care, discrimination in the workplace, and poverty policy. In this seminar we will explore feminist theory’s interrogation of State theory. We will pay particularly close attention to the feminist theory that explores the intersection between racism and sexism in America today. (PT)

GOVT 4665 Islamism (also NES 4553) (CA-AS)
The course deals with the rise of Islamism, read in tension with Derrida’s last extended interview, his writings on death and the death penalty. Throughout the seminar students explore Derrida’s conceptual interrogation of globalization, citizenship, hospitality, friendship, pedagogy, eros and death. (PT)

GOVT 4715 Critical Reason, The Basics: Kant, Hegel, Marx, Adorno (also GERST 4710) (KCM-AS)
This course deals with basic concepts and methods of Critical Theory from Kant to Adorno. Lectures will consider philosophy from the perspective of the political, demonstrating how autonomy, freedom, democracy, and law are approached by the following: critical reason, dialectics, materialist epistemology, and the socio-logics of non-identity. Students will tackle difficult primary texts in this tradition, with the goal of enhancing their own critical capacities to analyze political, social and economic life. (PT)

GOVT 4735 Marx, Freud, Nietzsche (also COML 4250, GERST 4150) # (CA-AS)
Fall. 4 credits. G. M. Fox.
For description, see GERST 4150.

GOVT 4769 Spinoza and the New Spinozism (also COML/GERST 4090, JWST 4790) (LA-AS)
Fall. 4 credits. G. Waite.
For description, see GERST 4090.

GOVT 4809 Politics of ‘70s Films (SBA-AS)
Spring. 4 credits. J. Kirshner.
The 10 years from 1967 to 1976 were an extraordinary time both in the history of American politics and in the history of American film. In the same period that the country was rocked by the Vietnam War, the feminist and civil rights movements, Watergate and economic crisis, the end of Hollywood censorship along with demographic and economic change in the industry ushered in what many call “the last golden age” of American film. In this class we study both film theory and political history to examine these remarkable films and the political context in which they were forged. The goal of the course is to take seriously both the films and their politics. (AM or PT)

GOVT 4817 International Conflict and Laws of War (SBA-AS)
Fall. 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 jus 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 juis ad bellum. These will include: preemptive force, rescue of nationals, humanitarian intervention, civil conflict, and terrorism. The course then turns to an examination of juis 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.

Monolingualism of the Other: Returns to conclude with Plato’s Apology, Crito and Phaedo, read in tension with Derrida’s last extended interview, his writings on death and the death penalty. Throughout the seminar students explore Derrida’s conceptual interrogation of globalization, citizenship, hospitality, friendship, pedagogy, eros and death. (PT)

GOVT 4877 Asian Security (also CAPS 4870, GOVT 6877) # (SBA-AS)
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)
This course examines current and historical issues in international relations from the perspective of international law, norms, and ethics. We develop general principles and concepts, such as “just war,” “national interest,” and “human rights,” and apply them to real-world situations. Most of the course is on particular cases that involve legal and ethical issues: violations of human rights...
and genocide; war crimes; military intervention; economic sanctions; environmental degradation; economic injustice. The first part of the course examines these issues using examples from 20th century international affairs, including recent events. The second section focuses on current issues that pose ethical problems for the foreign policy of the United States: internal violence and human rights abuses in the former Yugoslavia and former Soviet Union; indigenous uprisings in Mexico and their relation to U.S. foreign economic policy; the appropriate U.S. response to situations in countries such as Haiti, Nigeria, and China.

GOVT 4949 Honors Seminar: Thesis Clarification and Research
Fall. 4 credits. Prerequisite: acceptance into honors program. R. Bensel.
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. R. Bensel.

GOVT 4988 Politics and Policy: Theory, Research, and Practice (also AMST/CAPS 5000, 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 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
The first half of this course examines how to frame, evaluate, and compare empirical explanations in political science. Introduces several theoretical approaches that have been widely applied in political science research, including rational choice, social mechanisms, and functionalism. Students discuss the differences between explanation and description, emphasizing the idea of experimental manipulation. Building on this general discussion, the second half explores the distinctive methodological issues involved in comparing macro-social units and surveys a range of different approaches to comparative analysis.

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 interpret political point estimates that 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. 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
Fall. 4 credits. C. Anderson.
An in-depth, graduate-level introduction to qualitative and quantitative 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
Spring. 4 credits. J. Kioshner and 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. J. Frank and I. Kramnick.
A survey of the early modern political theory canon, emphasizing texts and writers from the 17th and 18th centuries. (PT)

GOVT 60101 Political Identity: Race, Ethnicity, and Nationalism
Fall. 4 credits. M. Jones-Correa.
The social sciences generally treat ethnicity, nationalism, and race as descriptive categories or variables, while avoiding actually defining these categories or thinking about how they should be used. How should we go about describing ethnicity, nationalism, and race? Should we treat them as primordial or as social constructions? Much of the recent literature suggests that the latter is constructed, by whom are they constructed (or by what)? What constrains/structures these constructions? What purposes do these constructions serve? Whom do they serve? Are some constructions better representations of identity than others, and what does this mean? How should we go about applying these categories in political analysis? (AM)

GOVT 6121 American Political Development in the 20th Century (also AMST 6121, AMST/GOVT 4041)
Fall. 4 credits. E. Sanders.
For description, see GOVT 4041.

GOVT 6142 Causes and Consequences of U.S. Foreign Policy (also AMST 6142, AMST/GOVT 4142)
Spring. 4 credits. E. Sanders.
For description, see GOVT 4142.

GOVT 6151 State and Economy in Comparative Perspective
Fall. 4 credits. R. Bensel.
Reviews the extensive literature on the political economy of comparative state formation, economic development, and institutional change. Topics include war-making and state expansion, regime evolution and modernization, and market processes and class transformation. The focus ranges from the micro-economic foundations of political choice through the grand historical forces that have shaped the contemporary world economy. Although much of the reading and discussion focuses on European cases, the limits of this experience as a theoretical model for the remainder of the world also are considered. (AM)

GOVT 6171 Politics of Public Policy
Spring. 4 credits. S. Mettler.
While the predominant approach to the study of political analysis gives little heed to politics, in fact public policies are defined through political processes, designed and implemented in the context of political institutions, and in turn shape the character of politics and public life. This course, therefore, examines approaches to the study of public policy that take politics seriously. Readings will explore a variety of approaches including rational choice, institutionalist, historical, behavioral, and social constructivist analyses. The first part of the course examines different models of the policy process that may inform policy analysis. The second part of the course investigates policymaking processes and institutions and examines stages of the policy process, including public mobilization, policy definition, agenda setting, policy design and implementation. Throughout the course, special attention is given to the American system, focusing on policymaking institutions, processes, and outcomes in that context. The course concludes with an examination of how policies, once created, may in turn restructure political processes and shape policies adopted subsequently. While the course literature tends to focus on the American context, students with interests in public policy whose area of research lies elsewhere are more than welcome.
[GOVT 6202] Political Culture (also AMST 6202)
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 into three parts, opening with a discussion of the material foundations of cultural ideation in socio-economic “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)
For description, see GOVT 4264.

[GOVT 6274] People, Markets, and Democracy
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. Shaffer.
For description, see GOVT 4241. (AM)

[GOVT 6301] Institutions (also AMST 6301)
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 political behavior, as well as briefly addressing law and judiciaries in order to broaden the sampling of specific cases and applications.

GOVT 6313 Seminar: Parties and Political Representation
Spring. 4 credits. K. Roberts.
This seminar explores some of the classic literature and contemporary comparative research on parties, party systems, and political representation. Readings will analyze party system dynamics in advanced industrial democracies as well as new democracies in post-communist and developing regions. They will draw from a range of theoretical perspectives, including the sociological, organizational, and rational choice institutional traditions. Topics to be covered include cleavage structures, organizational forms, party–society linkages, electoral strategies, clientelism, electoral volatility, and party system change. Assignments will include a research paper on a related topic.

GOVT 6353 Field Seminar in Comparative Politics
Spring. 4 credits. S. Tarrow.
This course provides an introduction to comparative politics, introducing students to classic theories and major recent contributions to the field. Topics to be covered include the comparative method, liberal institutions, modernization theory, ethnicity, economic development and contentious politics. The course will require extensive reading and assignments will include several review papers. (CO)

[GOVT 6393] Comparative Political Participation
This course is concerned with understanding how and under what conditions citizens seek to influence political elites through use, expansion, circumvention or subversion of existing channels of political participation. Cases from a variety of institutional contexts over time will be used to examine how mediating institutions diminish and/or exacerbate social inequalities in the exercise of political voice. We will consider how observations from other cultural contexts challenge dominant paradigms within American political science that shape how we think about political participation.

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. S. Martin.
For description, see FGSS 6170.

[GOVT 6523] Political Culture
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 6573] Comparative Democratization
This course compares recent democratization in Africa, the post-communist world, Latin America, Asia and southern Europe. We will focus on both transitional dynamics and the quality and sustainability of democracy and the relationship between nationalism and democracy, economic development and democracy, and economic performance and democratic governance.

[GOVT 6585] American Political Thought (also AMST 6585, AMST/GOVT 4585)
For description, see GOVT 4585.

 GOVT 6603 States and Social Movements (also SOC 6600)
Spring. 4 credits. S. Martin.
Two traditions run parallel in political sociology and comparative politics: the study of statebuilding and state transformation and the study of social movements and contentious politics. In the 1960s and 1970s, they converged in the work of scholars like Charles Tilly, who advanced both fields of study, which then ran along parallel but largely independent tracks. This course seeks to synthesize these two traditions, drawing on both historical and contemporary materials from Europe and the Third World, and searching for the key mechanisms and processes that link forms of contention to processes of statebuilding and state transformation. (CO)

GOVT 6615 Secession, Intervention, and Just-War Theory
This course examines philosophical viewpoints on secession, military intervention, legitimate reasons to go to war, and justice in prosecuting wars. Roughly the first half of the course will focus on the discussion of secession, while the second half will investigate intervention and war. Central texts include Allen Buchanan, Secession; David Miller, On Nationality; and Michael Walzer, Just and Unjust Wars.

GOVT 6625 Field Seminar in Political Theory
Introduces students to several contemporary approaches to political theorizing, with an emphasis placed on different modes of interpretation. Authors read may include: Althusser, Arendt, Bhabha, Foucault, Habermas, Kristeva, MacIntyre, Skinner, Strauss, Taylor, Wolin, and Zizek. (PT)

GOVT 6645 Democratic Theory (also AMST 6645)
Fall. 4 credits. J. Frank.
In contemporary political contexts “democracy” is often invoked as the very ground of political legitimacy. There is very little agreement, however, on what democracy means or how it is best embodied in state institutions and law. This seminar will introduce students to select debates in contemporary democratic theory over the normative meaning of democracy and the limitations of contemporary democratic practice. Beginning with the work of Rousseau and ending with debates over “radical democracy,” we will explore the following themes: How do democratic theorists and democratic actors negotiate the paradoxes of collective self-rule? What is the relationship between liberalism and democracy? Do rights suspend democracy or establish its preconditions? What are the best procedures for democratic decision-making? How does democracy deal with differences? Is democracy best understood as a form of government or a practice of resistance to domination? (PT)
[GOVT 6665 Media Theory: Film and Photograph (also VISST 6466)  

[GOVT 6685 Normative Political Theory  
This course will focus on normative approaches to political theory, beginning with the questions of what morality consists in and why (or whether) it might be binding on us. Authors read in this part of the course include Plato, Hume, and Kant. The course will then consider specific topics within normative theory, such as the question of whether individuals have obligations to obey political authority and what the moral status of property ownership and economic inequality might be. Authors read in this portion of the course include John Simmons, Michael Walzer, and G.A. Cohen.]

GOVT 6695 Modern Social Theory I  
Fall. 4 credits. S. Buck-Morss.  
Topics vary. (PT)

GOVT 6705 Modern Social Theory II  
Spring. 4 credits. S. Buck-Morss.  
In Fall 2007, we will read Walter Benjamin’s Arcades Project and in Spring 2008, 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-Simontians (industrial utopia) Bakunin (revolution) and Claire Démar (feminism). Advanced seminar, not recommended for undergraduates.

GOVT 6726 Psychoanalysis and Ideology  
Spring. 4 credits. D. Rubenstein.  
For description, see falcon.arts.cornell.edu/ Govt.

[GOVT 6775 Language and Politics  
This course explores the “linguistic turn” of recent political theory alongside canonical debates within 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. T. Pepinsky.  
This seminar surveys contemporary research on politics and the global economy. We will examine political phenomena as both causes and outcomes, concentrating on substantive theoretical claims and strategies of causal inference. Topics will include trade, finance, production, migration, development, and welfare.

[GOVT 6827 Unifying While Integrating: China and the World (also GOVT 4827)  
For description, see GOVT 4827.]

[GOVT 6857 International Political Economy  
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 6887 Political Economy and National Security  
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. P. Katzenstein and J. Weeks.  
Examines a variety of international relations theories in studying a broad range of security issues, including the causes of war, alliance formation, balance-of-power politics, security regimes, nuclear and conventional deterrence, the democratic peace, military strategy, terrorism, imperialism, and domestic constraints on the use of force. Uses a variety of theoretical perspective to investigate these and other issues, paying particular attention to evaluating the theoretical arguments with both historical and systematic evidence. (IR)

GOVT 6927 Administration of Agriculture and Rural Development (also IARD 6069)  
Spring. 4 credits. N. Uphoff and T. W. Tucker.  
For description, see IARD 6030.

GOVT 6999 CPAs Weekly Colloquium  
Fall. Spring. 1 credit. S–U grades only. Staff.  
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  
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 ILRBC 7060)  
Fall. 4 credits. L. Turner.  
For description, see ILRBC 7060. (CO)

GOVT 7073 Game Theory for Political Scientists  
Spring. 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 7281 Government and Public Policy (also AMST 4281/6281, GOVT 4281)  
Fall. 4 credits. T. J. Lowi.  
For description, see GOVT 4281. (AM)

GOVT 7605 Theoretical Approaches to Ideology  
Investigation of what is casually referred to as the “politics of meaning” is of course central to political theory and political science as a whole. However, profound controversies revolve around the definition of “ideology,” its relationship to the interests of dominant groups, the means by which it is circulated throughout diverse social sites, the ability of political agents to interrupt institutionalized ideologies, and the processes by which ideology penetrates and reconstructs the worldviews of the dominated. The groundwork for the seminar is laid by examining key texts on ideology by Marx. Students trace the multiple meanings of the term in his work and their various implications.

Next they explore the ways in which the study of gendered and racial discourse has transformed our understanding of ideology. Students address the Freudian and Lacanian interventions in ideology studies with respect to the concepts of the unconscious and misidentification. They discuss the ways in which Adorno, Horkheimer, and Habermas have re-articulated Marx’s formulations. The structuralist and post-structuralist schools are studied with reference to Saussure, Levi-Strauss, Barthes, and Althusser. Finally, students explore the problem of institutional analysis with reference to texts from the science and technology studies and state theory traditions. (PT)

GOVT 7625 Sexuality and the Law (also FGSS 4610/7620, GOVT 4625)  
Spring. 4 credits. 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."
2. Of the total nine courses:

1. Take nine history department courses (for seminars, history courses excluding first-year writing entry requirement: completion of the Major introductory American and/or European history courses and (2) earn at least a cum laude grade on the honors essay and on the oral exam.

3. Two of the nine courses must be 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 Seminar 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 with their advisor 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 before 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 & 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 1101 First-Year Writing Seminar: The Blues and American Culture Fall. 3 credits. Next offered 2009–2010. R. Polenberg.]

[HIST 1102 First-Year Writing Seminar: Immigrant Experiences (also AAS 1103) Spring. 3 credits. Next offered 2010–2011. D. Chang.]


[HIST 1190 First-Year Writing Seminar: Gandhi and the Politics of Non-Violence (also ASIAN 1118) Fall. 3 credits. Next offered 2009–2010. D. Ghosh.]

[HIST 1230 First-Year Writing Seminar: Monstrous Births, Scheming Midwives: Childbirth in Europe 1500–1700 Spring. 3 credits. Students should register through the First-Year Writing Program. R. Wiel.]

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 1300 First-Year Writing Seminar:
History of the Writing of History
Fall. 3 credits. Next offered 2010–2011.
A. Sachs.]

[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. Students should register through the First-Year Writing Program.
D. Magaziner.

The course offers a comparative study of Third World urban history. It begins around 1500 A.D., but focuses primarily on the production of the Third World in urban spaces during the 19th and 20th centuries. Students will theorize, analyze, and write about their spatial environments, while studying urban experience elsewhere. Subjects include pre-Columbian cities in the “New World,” Indian and South American cities, and, especially, the trajectories of urban life in the African diaspora. (AF)

Introductory Courses

HIST 1510 Introduction to Western Civilization # (HA-AS)
Summer and fall. 4 credits. D. Corinthians.
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 # (HA-AS)
Summer and spring. 4 credits. R. Weil.
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)
Summer and fall. 4 credits. HIST 1530 is not a prerequisite for HIST 1531. E. Baptist.
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.
R. Vanderlan.

An introductory survey of the development of the United States since the Civil War. (AM)

[HIST 1900 East Asia to 1800 (also ASIAN 1900) @ (HA-AS)
T. J. Hinrichs and K. Hirano.]

HIST 1910 Introduction to Modern Asian History (also ASIAN 1191) @ (HA-AS)
Fall. 4 credits. S. Cochran and T. Loos.
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. Next offered 2009–2010.
Staff.]

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. Next offered 2009–2010. Permission of instructor required. R. Polenberg.]

[HIST 2030 Wilderness in North American History and Culture (also AMST 2030) @ (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 2010–2001. A. Sachs.]

[HIST 2050 The French Enlightenment: Methods, Ambitions, Contradictions (also 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 2010–2001. 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 2009–2010. T. Loos.]

[HIST 2081 Microhistory and the Margins of Early Modern Europe (also HIST 2981) @ (HA-AS)
Spring. 4 credits. Limited to 15 students. D. Corpis.
This course will examine the practice of “microhistory” as a method for understanding early modern European culture and society. Microhistory as a genre of history writing has been most strongly developed by early-modern European historians and has largely dealt with the everyday lives of marginal but otherwise ordinary people—criminals, heretics, witches, lovers, peasants, and artisans. Students in this seminar will read exemplary contributions to the genre in an attempt to analyze the successes and shortcomings of this approach to history writing. Written assignments will ask students to theorize the relationship between everyday life and macrohistorical phenomena, to analyze specific microhistories, and to write their own microhistories based on primary sources such as memoirs and court cases. (EM)

[HIST 2090 Seminar in Early American History (also AMST/FGSS 2090) @ (HA-AS)

[HIST 2100 The Government of God (HA-AS)

[HIST 2110 Black Religious Traditions: Sacred and Secular (also AMST/RELST 2110) (HA-AS)

[HIST 2120 African–American Women in the 20th Century (also AMST/FGSS 2120) (HA-AS)

[HIST 2141 Crusade, Heresy, and Inquisition in the Medieval Mediterranean (also RELST 2150) @ (HA-AS)

HIST 2161 Iran and the World (HA-AS)
Fall. 4 credits. J. Weiss.
An introduction to the history, culture, and current international relations of Iran. Course will treat Iranian history from the earliest times to the present and the impact of Iranian culture. Iran’s relations with other countries, including its war with Iraq and its confrontation with international actors over its nuclear development will also be covered. Course exercises will include exchanges with Iranians and Iranian-Americans. (NE)

HIST 2170 Subversion as Foreign Policy (HA-AS)
Fall. 4 credits. T. Loos and R. Craib.
To what extent does the ideal of the U.S. as a vanguard for democracy and freedom in the world match up with other aspects—military, economic, and humanitarian—of U.S. foreign policy? We might ask the same question about the degree to which discourses and practices correspond with respect to countries like the former Soviet Union, China, and France. This seminar examines the ways in which foreign policy has been deployed over the course of the 20th century. We will address particular case studies in Indonesia, Vietnam, Guatemala, Chile, and others. Prominent themes will include forms of subversion, from military muscle to economic coercion, and how and why they have changed over time.
Fall. 4 credits. Limited to 15 students. Next offered 2009–2010. I. Hull.]  

[HIST 2190 Women and Gender in South Asia: State and Society from Pre-Colonial to Post-Colonial (also ASIAN 2219, FGSS 2190) @ (HA-AS)]  

[HIST 2200 Travel in American History and Culture (also AMST 2200) (HA-AS)]  

[HIST 2210 Pop Culture in China (also ASIAN 2210) @ (HA-AS)]  
Spring. 4 credits. T. J. Hinrichs.  
Exploration of the popular culture, society, and religion of Late Imperial China through reading of The Journey to the West (also known as Xiyou ji, Hsi yu chi, or Monkey) in translation and of scholarly works. Study of historical contexts in which this work was produced, performed, and read. Consideration of the emergence of a realm of "popular culture" in comparative perspective. (AS)  

[HIST 2211 Seminar: The Blues and American Culture (also AMST 2211) (HA-AS)]  
Fall. 4 credits. Limited to 15 students. I. Hull.]  
The customs and laws of war provided the first arena in which international law was systematically codified. This seminar therefore focuses on the laws of war as a means to introduce students to how international law develops, widens, and changes over time. We begin in the 17th century with the Thirty Year's War and then examine specific problems or events that illustrate the difficulties of regulating deadly conflict: forging international agreement, providing sanctions, establishing courts, responding to changes in technology or to new political challenges raised by colonial campaigns, guerrilla warfare, or terrorism. Students will study examples drawn from the 19th-century codifications (Geneva and Hague Conventions), World Wars I and II, and from the postwar period. (EM)  

[HIST 2230 International Law (HA-AS)]  
Spring. 4 credits. Limited to 15 students. I. Hull.]  

[HIST 2240 Art and Politics in 20th-Century Latin History (also LATA 2240) @ (HA-AS)]  

[HIST 2250 The U.S.–Mexico Border: History, Culture, Representation (also AMST/LSP 2250) (CA-AS)]  
Fall. 4 credits. M. C. Garcia.  
A writing-intensive, interdisciplinary sophomore seminar on the U.S.–Mexico border. The study of borders, and specifically of the U.S.–Mexico border, requires us to cross the disciplinary and methodological borders of academe itself. The proliferation of provocative writings on the border in recent years bears this assumption out: in no other field of study has the literature been so remarkably interdisciplinary: so methodologically eclectic; nor so theoretically provocative. This seminar intends to tap that literature to help students analyze and understand the histories, cultures, and representations of the border that are so important to contemporary self-fashioning and policy-making in the United States and Mexico. Readings include works of fiction, literary and cultural theory, history, science studies, and postcolonial criticism. Students can expect to write several papers of varying lengths that will develop their skills in historical research and textual criticism. (AM)  

[HIST 2251 Society and Religion in China (also ASIAN 2251) @ (HA-AS)]  
Fall. 4 credits. Limited to 15 students. Next offered 2009–2010. T. J. Hinrichs.]  

[HIST 2271 Family Life in Renaissance Italy (also ITAL 2270) @ (HA-AS)]  
Spring. 4 credits. Limited to 15 students. J. Najemy.  
The seminar explores the structures and sentiments of family life in Renaissance Italy, from the 14th to the 16th century, through a combination of translated primary sources and some secondary readings. Chief among the primary sources are 15th-century dialogues, On the Family, written by the humanist Leon Battista Alberti, supplemented by diaries and memoirs, letters, sermons, and prescriptive writings by fathers, humanists, and churchmen. Among the topics to be investigated will be the variety of family structures, marriage, sexual relations, wives and husbands, parents and children, family memory, and commemoration in art and religious life, domestic architecture, and families in politics. (ER)  

[HIST 2280 Indian Ocean World (also ASIAN 2228) @ (HA-AS)]  

[HIST 2290 Jefferson and Lincoln: American Ideas about Freedom (also AMST 2290) (HA-AS)]  

[HIST 2300 Seminar in History and Memory @ (HA-AS)]  
Fall. 4 credits. Limited to 15 students. Next offered 2010–2011. J. V. Koschmann.]  

[HIST 2311 Introduction to Military History # (HA-AS)]  
Fall. 4 credits. B. Strauss.  
An introduction to basic themes of military history (e.g., battle, strategy, tactics, war, and society), as well as classic works (e.g., Sun Tze, Thucydides, Clausewitz, Jomini). Recent theories in scholarship will also be emphasized. (EA)  

[HIST 2313 French Thought after May '68 (also COML 2331/GOVT 2626) (HA-AS)]  
Spring. 4 credits. C. Robic.  
The expression "May '68" is often used as a synonym for what has come to be known as "French Theory." This seminar will discuss works of authors such as Derrida, Barthes, Foucault, Deleuze, Althusser, and Lacan, and generating new conceptual models to rethink power relations, gender, language, and subjectivity more generally. Less well-known perhaps, is the reaction on the part of many French intellectuals against this current of "French Theory" and its philosophical, social, and political implications. In this seminar, we will begin by reading some of the foundational texts that emerged out of the events of May '68, before turning to authors such as Lefort, Clastres, Gauchet, Furet, and Rosanvallon, who have all written about the limitations of the pensée '68. (EM)  

[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 2009–2010. V. Caron.]  

[HIST 2360 Native Peoples of the Northeast (also AMST 2360) @ (HA-AS)]  

[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. S. Greene.  
The beginning of the 19th century witnessed the rapid and often times forceful expansion of Islam in West Africa, the end of the Atlantic slave trade, the transformation of the Zulu from a small, inconsequential people to the largest and most powerful ethnic group in South Africa, and the wildfire spread of Swahili as a lingua franca in east and central Africa. This course explores these revolutionary changes and the upheavals that accompanied them as Africa remade itself to face the modern era. Lectures, readings, and discussions will focus on the causes and consequences of these changes and their significance for understanding contemporary Africa. (AF)  

[HIST 2411 Enslaved! Then and Now # (HA-AS)]  
Fall. 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 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. R. L. Moore.  
This course is intended to provide historical background for understanding contemporary
debates about church/state controversy in American politics. (AM)

HIST 2430 History of Things (HA-AS)
Fall. 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 temporally; 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 2431 Families in China since the 17th Century (also ASIAN 2238) @
(HA-AS)]

HIST 2440 The United States in Vietnam (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 at 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 as
fictional accounts, primary sources, and occasional films. (AS)

[HIST 2450 Drugs: People, Policies, Politics (also LATA 2450) @ (HA-AS)]
Spring. 4 credits. Limited to 15 students. Recommended: previous course in Latin American

[HIST 2470 The Age of Charlemagne (HA-AS)]

[HIST 2480 Ghosts and Legacies: The Construction of Public Memory (HA-AS)]

[HIST 2491 French Social Thought from Rousseau to Foucault (HA-AS)]

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. (AR)

[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
the 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 ASRC 2304) @
(HA-AS)
Spring. 4 credits. D. Magaziner.
This course covers Muslim 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 explores 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)]

[HIST 2571 China Encounters the World (also ASIAN 2257, CAPS 2570) @
(HA-AS)]

HIST 2580 Periclean Athens (also CLASS 2682) @ (HA-AS)
Fall. 4 credits. H. Rawlings.
For description, see CLASS 2682. (EA)

HIST 2590 The Crusades @ (HA-AS)
Spring. 4 credits. P. Hyams.
A lecture course examining the Crusading Movement and the states it produced from the
11th century to the fall of the mainland Kingdom of Jerusalem in 1292. The historical
themes this generates are almost unlimited. The course treats the Christianity and Chivalry of
the Medieval West, the confrontation of this culture with those of the Mediterranean and
Islam, and what is perhaps the cradle of Western Colonialism. The very concept of
“Crusade” itself is problematic today and will continue to cast its shadow on U.S. dealings
with the Middle East. The sometimes spectacular readings allow students to choose from
a wide range of paper topics, and enjoy an excellent introduction to every aspect of
the long-gone world of the Middle Ages. (ER)

[HIST 2600 Latinos in the United States: Colonial to 1898 (also AMST 2599,
LSP 2600) @ (HA-AS)]

[HIST 2610 Latinos in the United States: 1898 to the Present (also AMST/LSP
2610) @ (HA-AS)]

[HIST 2620 The Middle Ages: Introduction and Sampler # (CA-AS)]

[HIST 2640 Introduction to Asian American History (also AAS 2130,
AMST 2640) (HA-AS)]

[HIST 2650 Ancient Greece from Homer to Alexander the Great (also CLASS
2675) # (HA-AS)]

HIST 2660 Introduction to Native American History (also AIS/AMST
2660) (HA-AS)
Spring. 4 credits. J. Parmenter.
With the abandonment of earlier perspectives grounded in romantic and evolutionary
stereotypes, Native American history represents today one of the most exciting,
dynamic, and contentious fields of inquiry into America’s past. This course introduces students
to the key themes and trends of the history of North America’s indigenous peoples by taking
an issues-oriented approach. We will cover material ranging from the debate over the
Native American population at the time of first European contact to contemporary social and
political struggles over casino gambling and land claims. The course stresses the ongoing
complexity and change in Native American societies and will emphasize the theme of
Native peoples’ creative adaptations to historical change. (AM)

HIST 2670 History of Rome I (also CLASS 2681) # (HA-AS)
Fall. 4 credits. E. Rebillard.
For description, see CLASS 2681.

HIST 2671 History of Rome II (also CLASS 2682) # (HA-AS)
Spring. 4 credits. HIST 2670 is not a prerequisite for HIST 2671. E. Rebillard.
For description, see CLASS 2682.
HIST 2672 History of Modern Egypt (also NES 2670)
Spring. 3 credits. Z. Fahmy.
For description, see NES 2670. (NE)

HIST 2674 History of the Modern Middle East in the 20th Century (also GOVT 2747, JWST/NES/RELST 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/RELST 2651) (HA-AS)
Fall. 3 credits. Next offered 2009–2010.
R. Bronn.

HIST 2711 Politics of Violence in 20th-Century Europe (also GOVT 2716) (HA-AS)
Spring. 4 credits. H. Case.
A survey of Europe's 20th-century history with special emphasis on uses of violence, including warfare, terrorism, genocide, uprisings, state-initiated domestic violence, rape, and other forms of violence. Discussions of First and Second World Wars and the political and ethical issues of the post-WWII period will be supplemented by less familiar instances of violence in the European context, including domestic violence. Lectures, readings, and written assignments will explore the factors determining who organizes, oversees, and commits violence, how it is interpreted, what reactions it provokes, and how states have sought to curtail or facilitate it. (EM)

HIST 2730 Women in American Society, Past and Present (also AMST/FGSS 2730) (HA-AS)
M. B. Norton.

HIST 2740 Foodways: A Social History of Food and Eating (HA-AS)
Fall. 4 credits. S. Kaplan.
An interdisciplinary examination of the validity of the phrase "what he eats." Among the topics: food and nutrition, food and social structure, the politics of food control, food and modernization, taste making, and food in religion and literature. (EM)

HIST 2750 History of Modern South Asia (also ASIAN 2275) (HA-AS)
Fall. 4 credits. Next offered 2009–2010.
D. Ghosh.

HIST 2770 Getting Medieval I: The Early Middle Ages (HA-AS)
Fall. 4 credits. This course fulfills the prerequisite for HIST 2771.
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.
O. Falk.
This course surveys European history in the period ca. 1000 to 1500 ad, when Western Europe was transformed. From inauspicious beginnings as Eastern Christendom and Islam's ragged cousin, it was able to bootstrap itself into the position of a dominant world civilization. We will look at developments in government, economy, technology, religious institutions and faith, cultural media, and social ideals. What enabled the "European miracle" of the later Middle Ages? How was it implemented and manifested? What were the costs of progress, and who bore them? Who reaped the benefits? (ER)

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.

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. P. Dear.
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 a cultural phenomenon. 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 of 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. HIST 2810 runs chronologically up to the death of Isaac Newton and focuses on the cultural traditions of Christian Europe and its selective appropriation of a Greek heritage. (HS)

HIST 2820 Science in Western Civilization: Newton to Darwin; Darwin to Einstein (also STS 2821) (HA-AS)
Spring. 4 credits. HIST 2820 is not a prerequisite for HIST 2820. P. Dear.
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. P. Hyams.
A survey of the army, society, social organization, and cultural and religious experience of the English people. Particular stress is laid on land settlement, the unification of the realm, the emergence of state institutions such as Parliament, and changes in economic organization (manors, towns, and commerce). The approach will be comparative within a context of contemporary European developments. The course offers students who wish to work on their writing skills an opportunity to do so, especially in the second paper. (ER)

HIST 2850 From Medievalism to Modernity: The History of Jews in Early Modern Europe, 1492 to 1789 (also JWST 2850) (HA-AS)
Fall. 4 credits. Next offered 2010–2011.
V. Caron.

HIST 2861 History of Zionism and the Birth of Israel (also JWST 2670, NES 2690) (HA-AS)
V. Caron.

HIST 2870 Evolution (also BIOEE 2070, STS 2871) (PBS)
Fall. 3 credits. W. Provine.
For description, see BIOEE 2070. (HS)

HIST 2890 The U.S.–Vietnam War (also ASIAN 2298) (HA-AS)
Fall. 3 credits. T. Logevall.
For description, see ASIAN 2298. (AS)

HIST 2891 Script and Culture in East Asia (also ASIAN 2299) (LA-AS)
Fall. 3 credits. B. Rusk.
For description, see ASIAN 2299. (AS)

HIST 2910 Modern European Jewish History, 1789 to 1948 (also JWST 2910) (HA-AS)
Fall. 4 credits. Next offered 2010–2011.
V. Caron.

HIST 2920 Inventing an Information Society (also ECE/ENGRG 2980, STS 2988) (HA-AS)
Spring. 3 credits. R. Kline.
For description, see ENGRG 2980.

HIST 2940 History of China in Modern Times (also ASIAN 2294) (HA-AS)
Fall. 4 credits. Next offered 2009–2010.
S. Cochran.

HIST 2960 East Asian Martial Arts (also ASIAN 2290) (HA-AS)
Fall. 4 credits. T. J. Hinrichs.
Exploration of the social, political, and cultural contexts of martial arts practice, and historical dynamics behind their transmission, transformation, and spread. Examination of the emergence of martial artists as popular figures, and martial arts as distinct sets of practices in China and Japan. Study of the modern re-invention of these practices, and of their transmission to other parts of the world. Investigation of a local martial arts school, and of the question, "What is East Asian about East Asian martial arts in Ithaca?" (AS)

HIST 2971 Politics, Culture, and Society in Early Modern Europe, 1450–1789 (HA-AS)
Fall. 4 credits. Next offered 2010–2011.
D. Corpis.

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.
M. Washington.
Historical exploration of African-American women from a sociopolitical perspective. Topics include women in Africa, slavery and freedom, labor, the family, gender cross-racially that begins with the African background and ends at 1900. (AM)
understand the divergent traditions, French colonial America in order to better compares the political, economic, and social each strove to displace the other as master of the next 240 years, these two European powers the first decade of the 17th century. For the century, both England and France established Following exploratory voyages during the 16th HIST 3170 British–French North America (HA-AS) Fall. 4 credits. R. Weil. The British Isles from the Restoration of Charles II through the Napoleonic wars. We will consider the domestic political, economic, and Empire; luxury, commerce, and the public sphere; continuing conflicts over religious toleration, popular politics, and the relation of England to Ireland and Scotland. Readings include works by John Locke, Jonathan Swift, Adam Smith, Thomas Paine, Edmund Burke, and Jane Austen. (EM) [HIST 3060 Modern Mexico: From Independence to the Zapatistas (also LATA 3060) @ (HA-AS) Spring. 4 credits. Next offered 2009–2010. R. Craib.] [HIST 3070 British History, 1760–1870 # (HA-AS) Fall. 4 credits. Next offered 2009–2010. T. R. Travers.] [HIST 3080 History of Post-War Germany (1945 to Present) (HA-AS) Fall. 4 credits. Next offered 2009–2010. I. Hull.] [HIST 3090 History and Geographical Imagination @ # (HA-AS) Fall. 4 credits. Next offered 2010–2011. R. Craib.] [HIST 3101 British History, 1870–Present (HA-AS) Spring. 4 credits. Next offered 2009–2010. T. R. Travers.] [HIST 3120Forging Nations: Experiments in Latin American Nation-Building and Reform (also LATA 3211) @ (CA-AS) Fall. 4 credits. Next offered 2010–2011. M. Roldan.] [HIST 3130 U.S. Foreign Relations, 1750–1912 (also AMST 3130) # (HA-AS) Spring. 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. Next offered 2010–2011. F. Logevall.] [HIST 3150 Environmental History: The United States and Beyond (also AMST 3510) @ (HA-AS) Spring. 4 credits. Next offered 2009–2010. A. Sachs.] [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. [HIST 3170 British-French North America (also AMST 3170) # (HA-AS) Fall. 4 credits. J. Parmenter. Following exploratory voyages during the 16th century, both England and France established permanent colonies in North America during the first decade of the 17th century. For the next 240 years, these two European powers each strove to displace the other as master of northeastern North America. This course compares the political, economic, and social patterns in the development of British and French colonial America in order to better understand the divergent traditions, approaches, and experiences that have resulted in multiple nations inhabiting the North American continent. Emphasis will be placed on critical comparative analysis of documentary sources. (AM) [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 3291) @ (HA-AS) Fall. 4 credits. Next offered 2009–2010. 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 2009–2010. M. B. Norton.] [HIST 3240 Varieties of American Dissent, 1880–1900 (also AMST 3240) (HA-AS) Spring. 4 credits. N. Salvatore. For description, see AMST 3240. [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 3260 History of the Modern British Empire (HA-AS) Fall. 4 credits. Next offered 2010–2011. T. R. Travers.] [HIST 3270 The Old South (also AMST 3270) # (HA-AS) Spring. 4 credits. Next offered 2009–2010. 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. [HIST 3300 Japan from War to Prosperity (also ASIAN 3335) @ (HA-AS) Spring. 4 credits. Next offered 2009–2010. J. V. Koschmann.] [HIST 3310 Causes of the American Civil War, 1815 to 1860 (also AMST 3310) # (HA-AS) Fall. 4 credits. Not open to freshmen. Next offered 2010–2011. E. Baptist.] [HIST 3331 Crosscurrents: Challenge and Change In Contemporary Latin America (also LATA 3300) (HA-AS) Fall. 4 credits. M. Roldan. This course will selectively focus on major issues facing Latin American societies from the early 20th century to the present. We will examine the varied political, social, cultural, and economic responses that emerged to challenges such as: modernization and modernity; mass politics and populism, state repression and authoritarian rule; market reforms and globalization; the narcotics economy and drug wars; urbanization and human displacement; human rights violations and new social and political movements. Assignments will revolve around films, web sites, readings, and lectures. Students will be expected to select and begin preparing a final research project—a portion of which involves collaborative work with other members of the class—from a list of suggested topics that will culminate in an in-class presentation and final research paper 10–12 pages in length at the end of the semester. (LA) [HIST 3340 19th-Century European Culture and Intellectual History (HA-AS) Fall. 4 credits. C. Robcis. This course provides an introduction to some of the major landmarks in European cultural and intellectual history, from the aftermath of the French Revolution to turn-of-the-century. We will pay special attention to the relationship between texts and their various contexts. Among other themes, we will cover the emergence of new social sciences such as sociology and anthropology; literary currents such as Romanticism, Naturalism, and Aestheticism; Continental philosophy from Hegel to Nietzsche; political models ranging from liberalism, nationalisim, feminism, to socialism; and artistic schools such as Realism, Impressionism, and Symbolism. (EM) [HIST 3341 20th-Century European Culture and Intellectual History (HA-AS) Spring. 4 credits. C. Robcis. This course provides an introduction to some of the major landmarks in European cultural and intellectual history, from the turn-of-the-century to about the 1980s. We will pay special attention to the relationship between texts and their various contexts. Among other themes, we will cover the invention and development of psychoanalysis from Freud to Lacan; the formation of new nationalisms and fascisms; artistic manifestoes from Surrealism, Dada, Cubism, primitivism, and négritude; phenomenology, existentialism, the Frankfurt School, and structuralism; May ’68 and its aftermath, with feminism, third-worldism, and anti-totalitarian thought. (EM) [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, 1825 to 1865 (also AMST 3400) (HA-AS) Fall. 4 credits. Not open to freshmen. R. Vanderlan. Topics include the Sacco-Vanzetti case; radicalism and reform in the New Deal; Franklin Roosevelt and World War II; the Holocaust and the atomic age; the Cold War and civil liberties; individualism and conformity in the 1950s; John F. Kennedy and the New Frontier. [HIST 3410 Recent American History, 1965 to the Present (also AMST 3410) (HA-AS) Spring. 4 credits. R. Vanderlan. Topics include the Supreme Court, civil liberties, the Great Society and the Vietnam War, politics and the presidency from Nixon to Bush; and class, race, and ethnicity in modern America.
this experience, the origins and consequences of the rise to power in this republican context of the Medici family, and the attempts by Florentine writers—poets, chroniclers, humanists, and historians—to understand and represent their complex society. (ER)

[HIST 3700 History of the Holocaust (also JWST 3700) (HA-AS)]
Spring. 4 credits. Next offered 2010–2011. V. Caron.]

[HIST 3710 World War II in Europe (HA-AS)]
Summer and fall. 4 credits. Next offered 2009–2010. J. Weiss.]

HIST 3720 Law, Crime, and Society in Early Modern Europe (HA-AS)
Spring. 4 credits. D. Corpus.
This course will survey the development of law, legal institutions, definitions of crime, and practices of criminality from the 16th to the 18th centuries. We often associate this period with extreme measures of law enforcement and repression following the persecution of converted Jews by the Inquisition or the witch burnings that raged through various parts of Europe in the 16th and 17th centuries. Yet much of our common knowledge of law and crime in early modern European history consists of exaggerations, myths, and misunderstandings. This course offers a corrective by exploring the historical contexts and meanings of law and crime in European society. Some of the themes covered in this course include the relationship between common law and Roman law, jurisdiction building and jurisdictional competition, the imposition of gender and sexual norms, heresy and witchcraft prosecutions, the sociology and anthropology of “criminal” subcultures, and the political process of “criminalization.” (EM)

[HIST 3750 The African American Workers, 1865 to 1910: The Rural and Urban Experience (also ILRCB 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 ILRCB 3860)]
Fall. 3 credits. Next offered 2009–2010. N. Salvatore.]

[HIST 3770 Topics in U.S. Women’s History (also AMST 3708)]
Spring. 4 credits. Prerequisite: FGSS/HIST 2730 or 3030, or permission of instructor. Next offered 2009–2010. M. B. Norton.

[HIST 3790 The First World War: Causes, Consequences (HA-AS)]

HIST 3840 Europe and Early Cold War (HA-AS)
Fall. 4 credits. J. Weiss.
A political and social history of Europe between the fall of fascism and the political crises of 1968. Emphasis on the comparative study of the elaboration of democratic institutions and ideologies. Topics include the origins and course of the Cold War in Western and Eastern Europe, Gaulism and Christian Democracy, the emergence of welfare states, liberal-democratic and Communist culture, the end of colonial empires in the West, oppositions movements in Eastern Europe, and the general upheaval of 1968. (EM)

[HIST 3880 History of Vietnam (also ASIAN 3396/6685, HIST 6880) @ (HA-AS)]
Fall. 3 credits. Next offered 2009–2010. K. Taylor.]

[HIST 3950 Premodern Southeast Asia (also ASIAN 3397, HIST 6950) @ (HA-AS)]
Fall. 4 credits. Open to undergraduates, both majors and non-majors in history, and to graduate students, although with separate requirements. Next offered 2009–2010. E. Tagliacozzo.]

HIST 3960 Southeast Asian History from the 18th Century (also ASIAN 3396/6696, HIST 6860) @ (HA-AS)
Spring. 4 credits. Graduate students must enroll in HIST 6960. T. Loos.
Surveys the modern history of Southeast Asia with special attention to its colonial history, 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/JWST/NES 3697, SOC 3970) @ (HA-AS)
Fall. 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. E. Baptist; spring, T. Loos.
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. J. Parmenter. (HR)

HIST 4002 Honors Research
Spring. 4 credits. Prerequisite: HIST 4000. Permission of instructor required. J. Parmenter. (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/LSIP 4050/6050, HIST 6050) (HA-AS)]

HIST 4060 Fighting Words: The First Amendment from World War I to the “War on Terror” (HA-AS)
Fall. 4 credits. R. Vanderlan.
The first amendment to the US constitution guarantees the “civil liberties” of Americans. This course considers how these rights assumed their modern form over the last one hundred years, paying particular attention to the development of modern free speech protections. We will focus on the relationship between politics, ideas, and the court system. Topics to be considered include the Palmer raids during WWI, the American Civil Liberties Union, McCarthyism, student protest, pornography, flag-burning, and the Patriot Act. (AM)

[HIST 4061 The New Cold War History (also HIST 6061) @ (HA-AS)]

HIST 4070 History/Memory of Asia-Pacific War (also ASIAN 4426) @ (HA-AS)
Spring. 4 credits. J. V. Koschmann.
This seminar will examine what is at stake when the fighting between Japan and its former enemies in the Pacific during World War II is remembered, memorialized, and (re) constructed as historical narrative by Japanese, Americans and others. By exploring the legacies of such events and processes as live testing of biological and chemical warfare agents, sexual slavery, mistreatment of POWs, incendary bombing, and the atomic bombings of Hiroshima and Nagasaki, the seminar will offer an opportunity to reflect in a more general way on the politics of historical representation and memory. (AS)

[HIST 4080 Feudalism and Chivalry: Secular Culture in Medieval France, 1000 to 1300 (HA-AS)]

HIST 4091 Contesting Identities in Modern Egypt (also NES 4605) @ (HA-AS)
Fall. 4 credits. Z. Fahmy.
For description, see NES 4605. (NE)

[HIST 4100 Archipelago: Worlds of Indonesia (also ASIAN 4409/6617, HIST 5100) @ (HA-AS)]
Spring. 4 credits. Open to undergraduates and graduate students, though with separate requirements. Limited to 15 students. Next offered 2009–2010. E. Tagliacozzo.

[HIST 4111 Undergraduate Seminar: History of the American South (also AMST 4302)]
Fall. 4 credits. Next offered 2010–2011. E. Baptist.]
HIST 4120 The Scientific Revolution in Early–Modern Europe (also STS 4211) (HA-AS)
Spring. 4 credits. P. Dear.
Modern science is often seen as having been originally developed in Europe in the 16th and 17th centuries. Copernicus, who set the Earth in motion around the sun in the early 16th century, and Newton, who made the universe an infinite expaurense filled with gravitational attractive forces, at the end of the 17th, frame this crucial period of European expansion. The new universe was invented at the same time as the discovery and exploitation of the New World and the establishment of new trading relationships with the East. This course, a weekly 4000-level seminar, examines the new ideas and approaches to nature promoted by European philosophers and mathematicians as part of this outward-looking enterprise aimed at the practical command of the world. We will read works by such people as Copernicus, Kepler, Bacon, Galileo, Descartes, Newton, and others, as well as important secondary literature, in order to understand how European thought attempted to integrate nature, God, and the state into new ways of making usable knowledge of the world. (HS)

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 4416/6616, FGSS 4160, HIST 5160) (CA-AS)

HIST 4170 History of Jews in Modern France (also FREN 4130, JWST 4170) (HA-AS)
Spring. 4 credits. Permission of instructor required. Next offered 2009–2010. V. Caron.

HIST 4200 Asian American Communities (also AAS 4240, AMST 4200) (HA-AS)

HIST 4221 British in India, 1750–1830 (CA-AS)

HIST 4231 Gender and Technology (also BSOC/FGSS/STS 4231) (HA-AS)
Spring. 4 credits. S. Pritchard.
For description, see STS 4231.

HIST 4240 Art and Politics in 20th-Century Latin America (also LATA 4240) (CA-AS)
Fall. 4 credits. Limited to 15 students. Permission of instructor required. HIST 1960, HIST 3331, or other Latin American course suggested. M. Roldan.
This seminar will examine how the intersection of art and politics shaped culture, ideology, and identity in Latin America from the Mexican Revolution to the dictatorships of the late 20th century. Topics may include muralism and the Mexican Revolution; the artist as muse and activist (Frida Kahlo); working class and immigrant culture in Argentina and the tango; samba as social and political protest in Brazil; gender and politics in exiled women’s literature; the appropriation of public spaces as artistic forum and mean of communication under authoritarian regimes. (LA)

HIST 4251 Ethics, Race, Religion, and Health Policy (HA-AS)
Fall. 4 credits. Offered in Cornell Washington Program. A. Kratz.

HIST 4260 The West and Beyond: Frontiers and Borders in American History and Culture (also AMST 4260) (HA-AS)

HIST 4261 Commodification in Historical Perspective: Sex, Rugs, Salt, and Coal (also AMST 4261) (CA-AS)

HIST 4270 Reading the Africa Diaspora (HA-AS)
Spring. 4 credits. D. Magazine.
This course is an upper level seminar in the history, historiography, and culture of the African diaspora. Students will read studies of the genesis, development, and current state of the diaspora, and engage in debates over race and difference, religion and economics, culture and politics. At the end of the semester students will produce a historiographical analytical essay on an area of their choosing, working closely with the instructor. (AF)

HIST 4280 Freud and His Commentators (also GERST 4270) (HA-AS)
Fall. 4 credits. C. Robics.
This seminar offers an introduction to Freud’s writings, organized more or less chronologically. From Freud’s early “case studies” to his more anthropological works and theories on the group, we will attempt to understand the specificity of the psychoanalytic method, as we engage with the historical context in which psychoanalysis emerged. We will also read a number of Freud’s critics (Jacques Lacan, Judith Butler, Douglas Crimp, Leo Bersani, Joan Copjec, David Eng, Jacqueline Rose, Tim Dean) in order to help us situate psychoanalysis in a contemporary political frame. (EM)

HIST 4300 America in the Camera’s Eye (also AMST 4302)

HIST 4310 Farmworkers (also CRP 3850/5850, HIST 6310, ILRRC 4020, LSP 4310/6310) (HA-AS)
Spring. 4 credits. R. Crail.
For description, see LSP 4310. (LA)

HIST 4311 Topics in American Studies: American Policy and Dissent, 1945–2000 (also AMST 4310)
Fall. 4 credits. N. Salvatore.
For description, see AMST 4310.

HIST 4320 Topics in Ancient Greek History (also CLASS 4320, HIST 6330)

HIST 4330 History of Modern German Jewry: From Enlightenment to the Post-1945 Era (also JWST 4330) (HA-AS)

HIST 4360 Conflict Resolution in Medieval Europe (also KCM-AS)
Spring. 4 credits. P. Hyams.
This seminar concentrates on a time (late 9th–13th centuries) when much of Europe lacked formal systems of justice, and so handled questions of social control quite largely by extra-legal means. Its subject is in one sense political history upside-down, as viewed by individuals rather than their rulers. We examine ways in which anthropology and some recent approaches to law can assist; the readings will be partly anthropology, partly translated medieval accounts of actual conflicts, with samples of recent interpretation. The topics covered should be of interest to law students and majors in anthropology and other modern social sciences. (ER)

HIST 4390 Reconstruction and the New South (also AMST 4039) (HA-AS)

HIST 4411 Fourth-Century and Early History of Greece (also CLASS 4410) (HA-AS)
Fall. 4 credits. Next offered 2009–2010. B. Strauss.

HIST 4421 To Be Enslaved Then and Now (also ASRC 4305) (HA-AS)

HIST 4440 American Men (also AMST/FGSS 4440) (HA-AS)

HIST 4451 New York Women (also FGSS 4220, STS 4221) (HA-AS)
Fall. 4 credits. Limited to 15 students. M. Rossiter.
For description, see STS 4221. (AM)

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 (CA-AS)

HIST 4501 Representing Atrocities: Questions of Historical Knowledge, Memory and Otherness in the Study of the Nanking Massacre Discourse (also ASIAN 4451)

HIST 4520 History of the New Europe (HA-AS)
Fall. 4 credits. Limited to 15 students. H. Case.
This course will focus on European leaders’ and intellectuals’ attempts to refashion or reinvent Europe through renewal projects initiated since the 19th century. Such projects often combined ideology and geopolitics to justify individual state actions, effect boundary shifts, assure the predominance of a certain strain of European culture, or maintain alliance systems within Europe. Readings will be taken from period authors whose works show how different countries and peoples across Europe have perceived their role in the “New Europe” of history, and what continuities/divergences exist between earlier ideas regarding the essence of Europe and those of today. (EM)

[HIST 4560 Topics in Medieval Historiography (also HIST 6560) # (HA-AS)]

[HIST 4570 Seminar in European Fascism (HA-AS)]
Fall. 4 credits. Permission of instructor required. Next offered 2009–2010. I. Hall.

[HIST 4581 Intelligibility in Science (also STS 4581) (HA-AS)]

[HIST 4601 Toward a Prehistory of Terrorism (HA-AS)]
Fall. 4 credits. O. Falk.
This course puts contemporary terrorism in a long-term historical context. We will read modern theoreticians of terror and counter-terrorism, as well as accounts by practitioners and witnesses. We will also look at pre-modern acts of fear-some violence. Does a current perspective on terrorism help us understand pre-modern ruthlessness in a new light? Can ancient and medieval texts illuminate the current crisis of terror? (ER)

[HIST 4621 The Enlightenment # (HA-AS)]
Fall. 4 credits. S. Kaplan.
An inquiry into the historical origins of European (especially French) political, social, and economic thought, beginning in the 1680s, at the zenith of Louis XIV’s absolutism, and culminating in the French Revolution a century later. Emphasis is on the relation of criticism and theory to actual social, economic, religious, and political conditions. An effort is made to assess the impact of enlightened thought on the 18th-century world and to weigh its implications for modern political discourse. Readings in translation from such authors as Bayle, Montesquieu, Voltaire, Rousseau, Diderot, and others as well as from modern scholarly and polemical literature. (EM)

[HIST 4630 War and Society in Eastern Europe (HA-AS)]

[HIST 4642 Women in the Modern Middle East (also HIS 6440, NES 4642)]
Spring. 4 credits. Z. Fahmy.
For description, see NES 4642. (NE)

[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. Next offered 2009–2010. Z. Chen.

[HIST 4660 Iroquois History (also AJS/ AMST 4660) # (HA-AS)]

[HIST 4680 Love and Sex in the Italian Renaissance (also ITAL 4680) # (HA-AS)]
Fall. 4 credits. J. Najemy.
An exploration of the representation of love, sex, and eros in Italian Renaissance literature, and the attempts by secular governments and the Church to manage, discipline, and punish sexual transgressions. Primary texts include Boccaccio’s Decameron, 15th-century novelle, plays by Machiavelli (Mandragola, Clizia) and Bibbiena (Calandrata), and Aretino. Secondary readings include studies of sexual crime, love across social boundaries, prostitution, homosexuality, and lesbianism. (ER)

[HIST 4691 The Old English Laws and Their Politico-Cultural Context (also ENGL 4190, HIST 6691) # (CA-AS)]
Fall. 4 credits. Next offered 2009–2010. P. Hyams and T. Hill.

[HIST 4740 Topics in Modern European Intellectual and Cultural History: The Human and the Animal (also COML 4741, JWST 4740)]
Fall. 4 credits. Limited to 15 students. D. LaCapra.
The problem of the relation between the human and the animal has been a recurrent concern over time in the so-called Western tradition, both in theology and in philosophy among other areas. A crucial issue is the quest for a decisive criterion dividing the human from the animal, the functions it serves in fantasy and reality, and the ways it has been challenged or contested. Another issue is the anthropocentric replication of stereotypes of the animal along with the binary opposition between human and animal even in seemingly critical approaches and in forms of both humanism and posthumanism. The role of a market economy, the nature of factory farming and of experimentation on humans, and the possibilities and limits of human-rights and animal-rights discourses will also be topics for discussion. More generally, the seminar will investigate the animal/human relation in thought and practice in various fields, including philosophy, theology, history, literature, and popular culture. Readings include Peter Singer, Eric Schlosser, Deborah Blum, J. M. Coetzee, Franz Kafka, H. G. Wells, Leslie Marmon Silko, Jean-Paul Sartre, Boris Sax, and Jacques Derrida.

[HIST 4741 Topics in Modern European Intellectual History: Trauma in Literature, History, and Film] Spring. 4 credits. D. LaCapra.
The course will focus on the complex relations among trauma, literature, film, and history, including the role of witnessing and testimony as well as gallows humor. It will treat a series of works (historical, theoretical, fictional, filmic, and generically hybrid) in which this problem arises in an acute form. Assignments include Leni Riefenstahl, Mel Brooks, J. M. Coetzee, W. G. Sebald, Binjamin Wilkomirski, Annette Wieviorka, N. Abraham and M. Torok, and F. Davenne and J.-M. Gaudilli. (EM)

[HIST 4747 History and Story in the Norse Sagas (also ENGL 4410, HIST 6760) (HA-AS)]

[HIST 4811 Confluence: Environmental History and Science and Technology Studies (also SHUM 4811)]
Fall. 4 credits. Limited to 15 students. S. Pritchard.
For description, see SHUM 4811.

[HIST 4813 Environments and Waterscapes (also SHUM 4813)]
Fall. 4 credits. Limited to 15 students. A. Sachs.
For description, see SHUM 4813.

[HIST 4814 Liminality in Maritime Archaeology (also NES 4914, SHUM 4814)]
Fall. 4 credits. Limited to 15 students. C. Monroe.
For description, see SHUM 4814.

[HIST 4815 Histories of Maritime Asia (also SHUM 4815)]
Fall. 4 credits. Limited to 15 students. J. Gaynor.
For description, see SHUM 4815.

[HIST 4816 Crossing Oceans of Time (also NES/SHUM 4816)]
Fall. 4 credits. Limited to 15 students. M. Aymes.
For description, see SHUM 4816.

[HIST 4821 Religious and Secular in American Culture (also AMST 4821) (HA-AS)]
Fall. 4 credits. Permission of instructor required. R. L. Moore.
This course probes American intellectual and cultural history by discounting a sharp division between what is secular and what is religious. In the United States the categories secular and religious have always interacted, allowing non-Americans to see Americans as at once the most religious of all people and the most conscious of worldly, practical matters. The readings and the writing assignments are aimed at rethinking classic debates, for example the role of religion in politics, the conflict between science and religion, and the alleged difference between religious and humanistic thought. The emphasis is not to convince students that Americans are unique in blending secular and religious but that key aspects of American history (the early separation of church and state, the importance of immigration and of non-European populations, the elaborate attempt to define American democracy as a moral system) have kept religion, and not just white Protestant evangelicalism, at the center of American culture. (AM)

[HIST 4831 Christianization/Roman World (also CLASS/RELST 4625) # (HA-AS)]
Fall. 4 credits. E. Rebillard.
For description, see CLASS 4625.

[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 4861 Classics and Early America (also CLASS 4683, GOVT 4862) # (HA-AS)
Fall. 4 credits. H. Rawlings.
For description, see CLASS 4683. (EA)

HIST 4870 Seminar on Thailand (also ASIAN 6601, HIST 6870) @ (HA-AS)

HIST 4900 New World Encounters, 1500 to 1800 (also AIS/AMST 4900) (HA-AS)
Fall. 4 credits. Limited to 15 students. J. Parmenter.
The discovery of the Americas, wrote Francisco Lopez de Gomara in 1552, was “the greatest event since the creation of the world, exciting the Incarnation and Death of Him who created.” Five centuries have not diminished either the overwhelming importance or the strangeness of the early encounter between Europeans and the indigenous peoples of the Americas. Taking a comparative approach, this course will conceptualize early American history as the product of reciprocal cultural encounters by assessing the various experiences of Spanish, French, and English newcomers in different regions of the Americas. Critical interpretation of primary source material will be emphasized in the course, as will the development of students’ abilities to reflect critically on these documents, taking into account the perspective of both the colonizers and the colonized. (AM)

HIST 4910 Approaches to Medieval Violence (also HIST 6920) # (HA-AS)

HIST 4921 India: Nation and Narration, History, and Literature (also ASIAN 4494) @ (CA-AS)

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. S. Cochran.
Conflicting interpretations of Chinese history during the late imperial period and the first half of the 20th century. (AS)

HIST 4950 Gender, Power, and Authority in England, 1600 to 1800 (CA-AS)

HIST 4961 History of Medicine and Healing in China (also ASIAN 4469, BSOC/STS 4961, HIST 6961) @ # (HA-AS)
Spring. 4 credits. T. J. Hinrichs. An exploration of processes of change in medicine in China. Focuses on key transitions, such as the emergence of canonical medicine, of Daoist approaches to healing and longevity, “of ‘Scholar Physicians,” and of Traditional Chinese Medicine in modern China. Inquires into the emergence of new healing practices in relation to both popular and specialist views of the body and disease, “cultivating vitality” practices, modes of transmission of medical knowledge, and healer–patient relations. Course readings include primary texts in translation as well as secondary materials. (AS)

HIST 4970 Jim Crow and Exclusion-Era America (also AAS 4470, AMST 4970/6970, HIST 6970) (HA-AS)

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 2009–2010. 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)

HIST 6010 European History Colloquium
Fall and spring. 2 credits each semester. Limited to graduate students. H. Case and D. Corpis.
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. Staff. 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, J. Parmenter.
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. E. Baptist.
Examination of major approaches, periods, issues, and modes of interpreting American history. Readings include recent “classics” of American scholarship from diverse subfields and genres. (AM)

HIST 6050 U.S.–Cuba Relations (also AMST/LATA/LSIP 4050/6050, HIST 4050)

HIST 6051 Themes and Issues in Modern European History

HIST 6061 The New Cold War History (also HIST 4061)

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 2009–2010. E. Tagliacozzo.

HIST 6101 Afro–American Historiography (also AMST 6101)

HIST 6102 Writing African–American History
Fall. 4 credits. M. Washington.
This course is a research and writing seminar for graduate students who are writing a M.A. thesis, a dissertation, or expect to be engaged in such a project in the near future. The students must come into the course with a well-conceived writing project, the project must be on some aspect of the Black experience. During the course, students will conduct research, report to the group, and meet with the professor individually, on a regular basis. An article- (or chapter-) length paper based on primary research will be handed in at the end of the semester. (AM)

HIST 6110 Slavery in North America
This reading seminar for graduate students examines North American slavery from the colonial era to 1865. The course explores the institution of slavery through secondary scholarship, within contexts of social, political, intellectual, economic, and territorial transformations. Our perspectives will be comparative, ideological, interpretive, critical, and methodological. The course will integrate recent scholarly trends with older schools of thought. (AM)

HIST 6140 Readings in Cultural Materialism: Theory and Practice

HIST 6150 The Past in the Present/The Present in the Past: Histories of Tokugawa Japan (also ASIAN 6615)

HIST 6160 Gender and Sexuality in Southeast Asia (also ASIAN 4416/6618, FGSS/HIST 4160)

HIST 6180 Readings in 20th Century U.S. Political, Intellectual, and Diplomatic History
Fall. 4 credits. Prerequisite: graduate standing. F. Loegovall.
The emphasis of this graduate seminar will be on reading and discussion of key works representing a variety of approaches. (AM)

HIST 6200 Intelligibility in Science (also STS 6201)
[HIST 6230] Nation, Empire, and Identity in 17th-Century Historiography

[HIST 6231] The Intellectual History of Early Modern Empire
Fall. 4 credits. R. Weil.
Empire affected the colonizers as well as the colonized. We will look at how European thinkers from the Renaissance through the early 19th century responded to the questions and challenges raised by encounter and conquest in the New World, Africa, Ireland, and Asia: justifications of territorial sovereignty, concepts of race and cultural difference, theories about luxury, trade, international law, the state of nature, imperial decadence, and imperial constitutions.

Readings include primary sources (F. de Vitoria, William Petty, Locke, Abbé Raynal, Diderot, Burke, Gibbon, Mill, Tocqueville, and travel and anti-slavery literature), as well as current scholarship and debate concerning empire to liberalism, enlightenment, racial theory, and natural law. (EM)

[HIST 6240] Culture, Commodities, and Capitalism in Europe, 1500-1800
Spring. 4 credits. D. Corris.
The period from 1500 to 1800 is often associated with Europe's transition from a pre-capitalist to a capitalist economy. Colonialism, commercial expansion, changes in the mode of production, and the expansion of markets, credit, and monetary instruments are often used as measures for this transition. This course seeks to locate the cultural conditions, which made this transformation meaningful and understandable to contemporary Europeans, as well as the cultural, intellectual, and philosophical implications and consequences of the rise of a capitalist economy. Topics we will consider include the Protestant work ethic, the gendering of the economy. Topics we will consider include the Protestant work ethic, the gendering of the economy. (EM)

[HIST 6260] Graduate Seminar in the History of American Women

[HIST 6270] Graduate Seminar in Early American History

[HIST 6280] Graduate Seminar: 19th-Century U.S. History

[HIST 6300] Topics in Ancient History (also CLASS 7682)

[HIST 6310] Farmworkers (also CRP 3850/5850, HIST 4310, ILRCB 4020, LSP 4310/6310)
Spring. 4 credits. R. Craib.
For description, see LSP 431. (LA)

[HIST 6320] Seminar in European Intellectual History (also COML 6720)
Fall. 4 credits. D. LaCapra.

[HIST 6330] Topics in Modern European Intellectual History (also COML 6730, JWS 6740)
Spring. 4 credits. D. LaCapra.
The course will explore the relations between history and critical theory with special attention to the study and writing of intellectual and cultural history. Specific topics will include gender, “orientalism,” racism, terrorism, and Nazism. A focus will be debates among historians and critical theorists on particularly controversial issues, including postmodernism and the so-called linguistic turn. (EM)

[HIST 6350] Early Modern Atlantic World (also AMST 6550)

[HIST 6410] Science, Technology, Gender: Historical Issues (also FGSS 6400, STS 6401)
Spring. 4 credits. S. Seth.
For description, see STS 6401.

[HIST 6420] The Politics of History-Writing: Historiography and Post-Colonial Criticism of South Asia

[HIST 6481] Seminar in Latin American History

[HIST 6540] Topics in East-Central European History

[HIST 6550] Early Modern Atlantic World (also AMST 6550)

[HIST 6560] Topics in Medieval Historiography (also HIST 4560)

[HIST 6610] Graduate Seminar in 20th-Century German History
Fall. 4 credits. Permission of instructor required. I. Hull.

[HIST 6641] Medieval Poverty

[HIST 6650] Historical Documents on Modern China (also CHIN 4425, HIST 4650)
Fall. 4 credits. Prerequisite: equivalent of three years Mandarin instruction. Permission of instructor required. Next offered 2009–2010. Z. Chen.

[HIST 6651] Law, Society, and Culture in the Middle East, 1200–1500 (also HIST/NEH 3651/6651, RELST 3651)
Spring. 4 credits. D. Powers.
For description, see NES 3651. (NE)

[HIST 6671] Spartacus (also CLASS 7667)

[HIST 6691] The Old English Laws and Their Politico-Cultural Context (also ENGL 4190, HIST 4691)
Fall. 4 credits. Next offered 2009–2010. P. Hyams and T. Hill.

[HIST 6730] Topics in Modern European Intellectual History (also COML 6730, JWS 6740)
Spring. 4 credits. D. LaCapra.

[HIST 6750] Genocidal Regimes
Fall. 4 credits. J. Weiss.

[HIST 6760] History and Story in the Middle East, 1200–1500 (also CLASS 7667)

[HIST 6800] Historical Approaches to Science (also STS 6801)
Fall. 4 credits. P. Dear.
Examines philosophical, methodological dimensions of recent historiography of science. (HS)

[HIST 6810] Intellectual History of Empire (also ASIAN 6681)

[HIST 6830] Seminar in American Labor History (also ILRCB 7081)
Fall. 3 credits. Prerequisite: graduate standing. Next offered 2009–2010. N. Salvatore.

[HIST 6861] Readings in Japanese Historiography (also ASIAN 6686)

[HIST 6870] Seminar on Thailand (also ASIAN 6601, HIST 4870)

[HIST 6880] History of Vietnam (also ASIAN 3385/6685, HIST 3880)

[HIST 6920] Approaches to Medieval Violence (also HIST 4910)

[HIST 6930] Problems in Modern Chinese History (also ASIAN 4493/6693, HIST 4930)
Fall. 4 credits. S. Cochran.
For description, see HIST 4930. (AS)

[HIST 6940] Problems in Modern Chinese History (also ASIAN 4494/6694, HIST 4990)
Fall. 4 credits. Prerequisite: HIST 2940 or permission of instructor. Next offered 2009–2010. S. Cochran.

[HIST 6950] Premodern Southeast Asia (also ASIAN 3397, HIST 3950)
Fall. 4 credits. Next offered 2009–2010. E. Tagliacozzo.)
HIST 6960 Southeast Asian History from the 18th Century (also ASIAN 3960/6966, HIST 3960) Spring. 4 credits. T. Loos. 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. T. J. Hinrichs. For description, see HIST 4961.

[HIST 6970 Jim Crow and Exclusion-Era America (also AAS/HIST 4970, AMST 4970/6970) Fall. 4 credits. Limited to 15 students. Next offered 2009–2010. D. Chang.]


HIST 7090 Introduction to the Graduate Study of History Fall. 4 credits. Requirement for first-year graduate students. B. Strauss and P. Hyams. 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 S&T 7111) Fall. 4 credits. T. Pinch. For description, see STS 7111. (HS)

HIST 7633 Gender and Late Antiquity (also CLASS/NEST/RELS 7633, FGSS 7630) Fall. 4 credits. K. Bowes and K. Haines-Eitzen. For description, see CLASS 7633.

HIST 8004–8007 Supervised Reading 4 credits each semester. Prerequisite: graduate standing. Permission of instructor required. Staff. (HR)

**HISTORY OF ART**


The Department of the History of Art provides a broad range of introductory and advanced courses in Western art (European and North American) and non-Western art (East and Southeast Asian, African), 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 North America), Southeast Asia, China, Japan, and Africa. Additionally, majors practice a range of art historical methods and interpretive strategies, including connoisseurship, dendrochronology, study of provenance, iconography, semiotics, 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. 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: a 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.

5000-level courses are seminars primarily for professional level.

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 2100 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 Johnson Museum of Art with gallery talks and viewing of relevant works that supplement the previous four days of classroom lectures.

**ARTH 2200 Introduction to Art History: The Classical World [also CLASS 2700] # (HA-AS)** Fall. 5 credits. A. Alexandridis. 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 Private Life [also ARKIEO/CLASS 2743] # (CA-AS)** Spring. 4 credits. A. Alexandridis. For description, see CLASS 2743.

**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 a.d. and the end of the 14th century a.d. Assignments will include two in-class and two take-home exams plus two shorter writing assignments.

**ARTH 2355 Introduction to Art History: Medieval Art and Culture # (CA-AS)** Spring. 4 credits. Next offered 2010–2011. C. Robinson. Survey lecture course covering the creation, encoding, and reception of Medieval (roughly AD 500–1500) European architecture, ornament, manuscripts, liturgical and luxury objects.

**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. 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. As a frame for interpreting these works, we will emphasize the social, religious, and political contexts in which artists worked and the role of patrons in the creative process. The course will also serve as an introduction to the art historical approaches through which we interpret these works today.

**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.
ART 2008-2009

[Pollock], and Pop Art (Warhol). Different critical approaches are examined.

ARTH 2672 Art, Politics, and Social Imagery: Art of the Avant-Gardes
Summer. 4 credits. J. Stojanovic.
The course focuses on development of modern art in the first third of the 20th century. It introduces the main themes of art in the period and summarizes the political context in which art developed: the First World War, the Russian Revolution, and the subsequent consolidation of the European dictatorships. A series of case studies that illuminate the important idea of "expression" in art, related questions of Orientalism and the "primitive," aspects of Cubism, are examined along with the development of abstract art, and the radical avant-garde movements—Dada, Soviet Constructivism, Surrealism.

[ARTH 3100 History of Photography (LA-AS)]
Spring and summer. 4 credits. Next offered 2010-2011. I. Dadi.
Provides a survey of the history of photography over a course of two centuries. Starting with its invention in the 1830s, this course covers the subject both topically and chronologically.

ARTH 3494 Iconography of Greek Myth (also CLASS 3727) # (HA-AS)
Spring, 4 credits. 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 Art History: Contemporary Art 1960 to Present (CA-AS)
Spring. 4 credits. Prerequisite: ARTH 2600 or equivalent. I. Dadi.
This course discusses new art practices since the 1960s. Although numerous artistic experiments took place during the first half of the 20th century, it was with the declining importance of modernism that painting and sculpture by the late 1950s that newer modes of artistic practice became established. The course will explore the rise of Fluxus, Minimalism, Conceptualism, Land Art, Video and Performance, Postmodernism, and made way for the classical as the expression of authority. The course concludes with Venice, with its distinct artistic traditions forged from the meeting of many cultures.

ARTH 3510 Introduction to African Art (also ASRC 3501) # (LA-AS)
Fall. 3 credits. S. Hassan.
Survey of the visual art and material cultural traditions of sub-Saharan Africa. It aims at investigating the different forms of visual artistic traditions in relation to their historical and sociocultural context. The symbolism and complexion of traditional African art are explored through the analysis of myth, ritual, and cosmology. In-depth analysis of particular African societies is used to examine the relationship of the arts to indigenous concepts of time, space, order, form, and sociopolitical order. New and contemporary art forms associated with major socioeconomic changes and processes of assimilation and accumulation are also explored. These include tourist art, popular art, and elite art.

ARTH 3520 African American Cinema @ (LA-DS)
Spring. 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. M. Fernandez.
This course is designed as a thematic survey of Latin American art from the early 20th century to the present. Attention is given to issues such as: the effect of colonialism on Latin America's visual arts, the creation of national artistic styles, the relation of Latin American art and artists to European and American culture centers, the interaction of high art and popular culture, the role of art criticism on popular perceptions of Latin American Art, and the contributions of Latin American women to various aspects of artistic practice. Special classes will examine border arts and Latin American artists' exploration of electronic technologies.

ARTH 3600 Introduction to Art History: Contemporary Art 1960 to Present (CA-AS)
Spring. 4 credits. Prerequisite: ARTH 2600 or equivalent. I. Dadi.
This course discusses new art practices since the 1960s. Although numerous artistic experiments took place during the first half of the 20th century, it was with the declining importance of modernism that painting and sculpture by the late 1950s that newer modes of artistic practice became established. The course will explore the rise of Fluxus, Minimalism, Conceptualism, Land Art, Video and Performance, Postmodernism, and
Postcolonialism. These practices are situated in relation to intellectual and social movements since the 1960s, including counterculture, feminism, race, ecology, institutional critique, and globalization. This course focuses primarily on European and American art, but also incorporates selected global developments.

[AUTH 3605 U.S. Art from FDR to Reagan (also AMST 3605) (LA-AS)]
Considers the contextual features of American art from the 1930s through the late 1980s. Examines a few of the developments on which the course focuses are: Abstract Expressionism, Pop Art, Earth Art, and Feminist Art.

[AUTH 3607 Orientalism and Representation @ (HA-AS)]
Explores how the Orient has been represented in Western art, architecture, literature, and media since the 19th century.

[ARTH 3661 Art of South Asia, 1500-present (also ASIAN 3382) @ # (KCM-AS)]
Spring. 4 credits. J. Dadi.
South Asian art since the early modern era, including Vijayanagar architecture, Mughal art, British colonial art, posters, and modern painting.

[ARTH 3650 History and Theory of Digital Art (also INFO 3660, VISST 3650) (CA-AS)]
Students will examine the role of mechanical, electronic, and digital technologies in the arts of the late 20th and 21st centuries with emphasis on Europe and North America.

[ARTH 3740 Painting 19th-Century America (also AMST/VISS 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”; artists: explorers, Darwin, and Latin America as a spectacle; class and gender construction in the Gilded Age; the Ashcan School, New York City, and urban spectator; immigrants and early documentary photography. Alongside paintings we consider political cartoons, fashion plates, advertisements, and popular illustrations.

[ARTH 3760 Impressionism in Society (also VISST 3662) (CA-AS)]
Spring. 4 credits. Not open to freshmen. Recommended: ARTH 2400. L. L. Meixner.
Discusses French Impressionist art as the product of 19th-century public life. By relating Impressionist 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 ARKEO 3800) @ # (LA-AS)]
This course offers a survey of the art and culture of China, from the Neolithic period to the 20th century. Students work directly with objects in the Herbert F. Johnson Museum of Art.

[ARTH 3820 Introduction to the Arts of Japan (also VVISST 3381) @ # (LA-AS)]
Fall. 4 credits. 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 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 4100 Prosensitive (also VISST 4607) (CA-AS)]
Spring. 4 credits. Limited enrollment. Prerequisite: history of art majors. Grad students 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 4670) (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. M. Fernandez.
This seminar will introduce students to theoretical texts relevant to multiple areas in the history of art and visual culture. Readings will include classic texts in post-structural theory and more recent writings in new areas of theory and artistic practice including: digital art, cyberfeminism, globalziation, architecture in/as visual space, biotechnology and artificial life as well as issues in cognitive science and human computer interaction centering on space and embodiment. Occasionally, the seminar will focus on a single topic of convergence for these diverse areas.
ARTH 4232 Images of Women in Antiquity (also ARTH 6232) # (CA-AS)
Spring. 4 credits. A. Alexandridis.
Gender Studies for the ancient Greek and Roman world have focused on either a social history of women or on difference. This seminar will combine both approaches with specific emphasis on images (visual and textual) of women and the methods of their interpretation. We will discuss representations of women from all social classes, the public and private life of women, concepts of the female body as well as female figures (heroines and monsters) in myth.

ARTH 4236 Sexuality in Greek and Roman Art (also ARTH 6236, CLASS 4733) # (CA-AS)
Fall. 4 credits. A. Alexandridis.
The question whether sexuality is a given or instead constructed has been and continues to be intensely discussed since Michel Foucault published his Histoire de la sexualité. As the three published volumes of this work are centered on the ancient ‘classical’ world, it is particularly appropriate to study Greek and Roman Art with and against Foucault’s vision. We will consider images of the male and the female body in visual representations as well as literary and scientific texts; the idea of hetero- and homosexuality; phenomena that are considered to be transgressive such as cross-dressing, hermaphroditism, or bestiality. Particular emphasis will be on the rendering of sexual acts in texts and images. This mixture of familiarity and otherness will help to question deep-rooted assumptions on sexuality and the body.

ARTH 4311 The Multicultural Alhambra (also NES 4511, VISST 4621)
Spring. 4 credits. C. Robinson.
An interdisciplinary seminar structured around the mythic palace built by the Nasrid dynasty in Granada, Spain. We will use primary sources in various genres, critical writings in the field of post-colonial theory, and secondary literature spanning the 19th, 20th and now 21st centuries, including Elena Díez Jorge’s Para una lectura multicultural de la Alhambra de Granada (Granada 2000). We will consider the building through the variety of lenses offered by Washington Irving, Ibn al-Khatib, Pedro el Cruel, Isabel la Católica, Charles V, and others, in order to deconstruct the mythopoeic uniqueness and view it as a monument representative of the continuous performance of cultural translations offered by late medieval Iberia.

ARTH 4315 Visualizing the Sacred in Late Medieval Iberia: Images and Image Devotion in a Multi-Confessional Landscape (also ARTH 6315, NES 4523/6523)
Examines the role of images, including “sacred” or “miraculous” ones, in the Christian, Jewish and Muslim Iberian devotional imaginary during the final centuries of the Middle Ages. As part of these preparations for an exhibition to be held in the Johnson Museum in 2010 entitled “Constructions of Devotion.”

ARTH 4331 Topics in Islamic Art: The Almoravids, the Almohards, and the “Sunni Revival” (also ARTH 6331, NES 4731/6731) @ # (HA-AS)
Fall. 4 credits. C. Robinson.
This seminar, using a wide variety of primary and secondary sources, will examine the visual and literary culture of the two ‘fundamentalist’ North African dynasties that al-Andalus (Islamic Spain) during (a large part of the 12th and 13th centuries, considering particularly whether the concept coined by art historian Yasser Tabbaa of ‘an art of sunni revival’ is applicable in this case. We will also examine interactions between these two dynasties and the Christian kingdoms with which they shared the Iberian peninsula, and will consider the Iberian situation in comparison with that which obtained between the Crusaders in the Eastern Mediterranean and the Muslim dynasties against whom they fought for control of the Holy Land.

ARTH 4395 Looking for Love: Visual and Literary Cultures of Love in the Medieval Mediterranean 1100-1400 AD
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, Egypt, and Persia) court of ‘Courty Love’ beginning during the 11th century A.D., 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 endure, 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 4440 Constructing the Self in the 16th Century (also ARTH 6440) # (HA-AS)]
Examines the construction of the self through gender, class, and group identity in early modern Europe, especially Italy.

ARTH 4450 Representations of Women in the Italian Renaissance (also ARTH 6450, FGSS 4510) # (HA-AS)
Spring. 4 credits. C. Lazzaro.
This seminar investigates representations of women in portraits of upper class women, images of ideal beauty, and of courtesans and poets. It examines the conventions of representing women, whether the Virgin Mary and the saints, or heroines such as Judith and Lucretia, and the gender roles that they reinforce. The seminar also studies women artists and women patrons, considering both what they painted and commissioned, compared with their male counterparts, and how they functioned as independent women within the constraints of their society. Readings discuss all these issues from a variety of points of view. The aim of most of these readings, and especially of class discussion, is to see the complexities, ambiguities, and contradictions of this society.

ARTH 4451 Prints and Visual Culture in Early Modern Europe (also VISST 4451) # (HA-AS)
Fall. 4 credits. Meets at the Johnson Museum. C. Lazzaro.
This seminar introduces students to prints and to the major printmakers of the period, including Marcantonio Raimondi, Dürer, and Rembrandt, while giving them first-hand experience with original prints in the Herbert F. Johnson Museum. Weekly readings consider the uses, appreciation, handling, and collecting of prints, as well as the social, cultural, and political issues raised in their production. Among these issues are the social hierarchies of class and gender (including witches), moral concerns and religious devotion, the construction and transmission of notions of antiquity and classicism, and the representation of the urban and rural environment.

ARTH 4508 Exhibiting Cultures: Museums, Monuments, Representation and Display (also AMST 4508/6508, ARTH 6508, ASRC 4504/6504) (CA-AS)
Fall. 4 credits. Grad students should enroll in 6508. C. Finley.
This seminar explores the ways in which our contemporary understanding of art, history, and culture is constructed and informed by public display in museums, galleries, and the broader cultural landscape. Using a series of case studies, we consider issues of representation and display and the wider social context in which art and culture are presented. Topics include the ‘blockbuster’ exhibition, cultural heritage museums, the effect of globalization on the museum industry, recent developments in the monument making and the UNESCO Slave Routes Project. Our specific focus will be on African, African-American and African diaspora art and visual culture.

ARTH 4525 Rastafari, Race, and Resistance (also ASRC 4526, VISST 4625)
Fall. 4 credits. P. Archer-Straw.
Seminar focusing on Jamaican artists whose images stem from Rastafarianism. Examines how their cultural expression born out of a clash of European and African civilizations challenged western cultural values and posited new ways of talking about race and spirituality. Rastafarianism is viewed as an aberrant modern paradox, at once a vehicle for racial resistance and a belief system advocating universal equality.

ARTH 4600 Studies in Modern Art (LA-AS)
Spring. 4 credits. Permission of instructor required.
Topic for Spring 2009: Art and the Counterculture (1964–74). Avant-garde art in America (1964–74) will be studied as a reaction to the policies of LBJ and Nixon, in particular, to our involvement in Vietnam. Art will be explored in the context of widespread questioning of institutional authority, of gender and racial stereotypes, and of the modernist canon.
ARTH 4690 Comparative Modernities (also ARTH 6690, VISST 4641) @ (CA-AS)
Fall. 4 credits. I. Dadi.
Since the late 19th century, the effects of capitalism across the globe have been profoundly transformative and have intensified with the demise of the older colonial empires, the rise of nationalism and independent states, and the trend of neoliberal globalization. These transformations are manifested in the domains of high art, mass culture and popular culture, yet remain inadequately studied. This seminar theorizes and explores non-Western modernist and postmodernist art practice in a comparative framework. Taught as a seminar, it assumes active participation by advanced undergraduate and graduate students who have a prior knowledge of Euro-American modernism and art history, and who wish to better understand the great artistic and visual transformations in the 20th century in a global context.

ARTH 4761 Art and Social Histories (also AMST 4306, VISST 4761) (CA-AS)
Fall and spring. 4 credits. Permission of instructor required. Auditing not permitted. Open to freshmen. L. Mexiner.

Fall 2008: Caricatures, Political Cartoons, and Laughter
Caricatures and political cartoons in everyday life. Focuses on modern images and their historical origins—portrayal, lowlife genre painting, physiognomic theory, and carnival. Considers Leonardo, Bruegel, and Tiepolo as they influenced the moderns: Daumier, Hogarth, Nast, American Socialist and WPA printmakers, and Dr. Seuss. Special attention to Goya’s Los Desastres de la Guerra and Los Caprichos. Themes include street theatre and caricature; prints and mass audiences; children’s book illustrations as political texts; social protest and satire; Chaplin and filmic caricature; cartoons and censorship. Students may relate these to present-day comics and controversies. Theorizes lithography as subversive, the grotesque as utopic, caricature as history; laughter as public performance. Will read Baudelaire on caricature, Balzac on laughter, and Umberto Eco on ugliness.

Topic for Spring 2009: The Long 19th Century. Discusses the newest scholarship on the long 19th century—1789–1914—for the first time as a coherent period in the history of art and visual culture. Using the body as an organizing principle, we will take a comparative approach to art production in England, Europe, and the U.S. Topics are framed by the French Revolution and World War I to include: the body as a political state, social fragment, cultural appropriation, gender construct, carnival, spectacle, archive, pathology, and anarchy. We will look across art history to include painting, print culture, and popular entertainments.

ARHT 4813 Arts of the Song Dynasty
Spring. 4 credits. Prerequisite: Permission of instructor required. A. Pan.

Topic for Spring 2009: Tea Ceremony and its diaspora. This seminar focuses on the cultural phenomena of tea cultures in East Asia, namely China, Korea, and Japan. Social, economic, and aesthetic concerns pertaining to tea cultures will be addressed in our weekly discussion.

ARHT 4815 Buddhist Arts of China (also ARTH 6815) @ (CA-AS)
Fall. 4 credits. A. Pan.
Buddhism has been integral to Chinese culture and development since the early Christian era (Eastern Han Dynasty). It stood on a par with Confucianism and Daoism, offering alternatives for shaping Chinese culture throughout the centuries. Chinese Buddhist art likewise provides insights into different stages of religious, philosophical, cultural, and social transformation in China. “Buddhist Arts in China” offers a broad, cross-disciplinary understanding of how a profound foreign influence on one of the oldest civilizations on Earth transformed Buddhism and Buddhist art along the way.

[ARHT 4816 Modern Chinese Art @ (HA-AS)

Issues covered include: Chinese debates on western influence and pluralistic approaches and arguments on “Chinese identity.”]

ARHT 4938 Leon Battista Alberti: Architect as Orator # (LA-AS)
Fall. 4 credits. P. Morin.
Alberti’s work reverberates with the voices of other texts and edifices. This class investigates the work of Alberti in relation to these literary and architectural precedents. The seminar combines weekly lectures on selected themes with student individual research projects. Themes include the construction of architectural identity, the quest for fame, aesthetic theory and its origins in classical rhetoric. The objective of the course is to familiarize the student with all of Alberti’s primary works on the arts, both painting and architecture as well as some of his more important literary texts. As a means of unpacking Renaissance aesthetic theory, students are introduced to Classical communications theory through the texts of Aristotle and Cicero.

ARHT 4939 The Architectural Treatise in the Renaissance: Tradition and Innovation
Spring. 4 credits. P. Morin.
One of the most inventive periods in Western architecture are the great architectural treatises. Vitruvius’ Ten Books of Architecture, the only architectural treatise to have survived antiquity, was the foundation from which architectural theory was built in the Renaissance. Alberti’s De re aedificatoria (1452), inaugurated a period of intense architectural treatise writing. This seminar examines Renaissance treatises, which include Filarete’s Libro architettonico (1460), Francesco Colonna’s Hypnerotomachia Polypibbi (1490), Philibert De L’Orme’s Le Premier tome de L’Architecture (1567), Salustianino Serlio’s Architettura (1584), and Palladio’s Quattro Libri dell’Architettura (1570). We will examine the myths and evolution of the architectural order, issues of authority, origins, imitation, invention and communication. Through our engagement with architectural texts we will study the impact of sciences, new technologies, politics, domesticity, and morality.

ARHT 4991 Independent Study
Fall or spring. 2-4 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.

ARHT 4992 Independent Study
Fall or spring. 2-4 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.

ARHT 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.

ARHT 4998 Honors Work I
Fall or spring. 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.

ARHT 4999 Honors Work II
Fall or spring. 4 credits. Prerequisite: ARHT 4998.
The student under faculty direction prepares a senior thesis.

Examines cultural understandings of nature in early modern Europe, especially Italy.]

ARHT 5505 Contemporary African Diaspora Art (also ASRC 6500, VISST 5060)
Spring. 4 credits. C. Finley.
Since the 1950s, projects of African decolonization and Black liberation and empowerment have influenced the work of African Diaspora artists in the Black Atlantic. Pivotal historic events, such as the Civil Rights Movement, the dismantling of colonial rule in Africa and the Brixton race riots in England, have urged Black artists to reexamine issues of memory, identity, history and belonging. This course considers those artists who trace a visual genealogy of the African Diaspora and Work in what has been identified as a practice of remembrance. We will focus on Artists working after 1960, but also will study the roots of the 20th century and in earlier periods.

ARHT 5850 Dancing the Stone: Body, Memory, and Architecture (also ASIAN 5581, THETR 5800, VISST 5280)
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.


Explores how patterned cloths serve as symbolic medium, functioning on multiple levels of understanding and communication.

**ARTH 5991–5992** Supervised Reading 5991: fall, 5992: spring. 4 credits; may be repeated for credit. Prerequisite: graduate standing.

**ARTH 5993–5994** Supervised Study 5993: fall, 5994: spring. 4 credit; 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. M. Fernandez.

For description, see ARTH 4150.


For description, see CLASS 7742.

**ARTH 6315** Visualizing the Sacred Iberia (also ARTH 4315) Fall. 4 credits. Next offered 2009–2010. C. Robinson.

For description, see ARTH 4315.

**ARTH 6440** Constructing the Self in the 16th Century (also ARTH 4440) Spring. 4 credits. Next offered 2009–2010. C. Lazzaro.

For description, see ARTH 4440.

**ARTH 6450** Representations of Women in the Italian Renaissance (also ARTH 4450, FGSS 4510) Spring. 4 credits. C. Lazzaro.

For description, see ARTH 4450.

**ARTH 6508** Exhibiting Cultures: Museums, Monuments, Representation and Display (also AMST 4508/6508, ARTH 4508, ARSC 4504/6508) Spring. 4 credits. Undergraduates should enroll in ARTH 4508. C. Finley.

For description, see ARTH 4508.

**ARTH 6690** Comparative Modernities (also ARTH 4690, VISST 4641) Fall. 4 credits. I. Dadi.

For description, see ARTH 4690.

**HUMAN BIOLOGY PROGRAM**


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 study of human biology 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 design their 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 or 1105 or equivalent); one course in genetics (BIOG 2800, 2810, or 2820); one course in biochemistry (BIOG 3300, 3310, 3320, or 333 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 field, who may 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**

<p>| ANSC 4100 Nutritional Physiology and Metabolism | Fall. 3 credits. |
| BIOP 2140 Biological Basis of Sex Differences (also BSOC 2141, FGSS 2140) | Spring. 3 credits. |
| BIOP 3110 Introductory Animal Physiology, Lectures (also VETPH 3460) | Fall. 3 credits. |
| BIOP 3190 Animal Physiology Experimentation | Fall. 4 credits. |
| BIOP 4270 Fundamentals of Endocrinology | Fall. 3 credits. |</p>
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOAP 4580</td>
<td>Mammalian Physiology</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>BIOBM 4340</td>
<td>Applications of Molecular Biology to Medicine, Agriculture, and Industry</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>BIOBM 4390</td>
<td>Molecular Basis of Human Disease (also BIOGD 4390)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>BIOEE 2740</td>
<td>The Vertebrates: Structure, Function, and Evolution</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>BIOGD 4870</td>
<td>Human Genomics</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>BIOMI 4170</td>
<td>Medical Parasitology (also VETMI 4310)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>NS 1150</td>
<td>Nutrition, Health, and Society</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>NS 1220</td>
<td>Nutrition and the Life Cycle</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 3150</td>
<td>Obesity and the Regulation of Body Weight (also PSYCH 3150)</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 3220</td>
<td>Maternal and Child Nutrition</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 3310</td>
<td>Physiological and Biochemical Bases of Human Nutrition</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 3410</td>
<td>Human Anatomy and Physiology</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 3610</td>
<td>Biology of Normal and Abnormal Behavior (also PSYCH 3610)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>NS 4210</td>
<td>Nutrition and Exercise</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 4310</td>
<td>Mineral Nutrition and Chronic Disease</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>NS 4410</td>
<td>Nutrition and Disease</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>NS 4750</td>
<td>Mechanisms Underlying Mammalian Developmental Defects (also BIOAP 4750)</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 6140</td>
<td>Topics in Maternal and Child Nutrition</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 3220</td>
<td>Hormones and Behavior (also BIONB 3220)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 4250</td>
<td>Cognitive Neuroscience</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 4400</td>
<td>Human Evolution: Genes, Behavior, and the Fossil Record</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 2200</td>
<td>Early People: The Archaeological and Fossil Record (also ARKEO 2200)</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 3390</td>
<td>Primate Behavior and Ecology</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 3490</td>
<td>Topics in Biological Anthropology</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 4390</td>
<td>Topics in Biological Anthropology</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 1300</td>
<td>Human Evolution: Genes, Behavior, and the Fossil Record</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 3375</td>
<td>Evolutionary Theory and Human Behavior</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 3359</td>
<td>Primate Behavior and Ecology</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 3710</td>
<td>Human Paleontology</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>BIOMI 4170</td>
<td>Medical Parasitology (also VETMI 4310)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 4250</td>
<td>Cognitive Neuroscience</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 4270</td>
<td>Evolution of Language (also COGST 4270)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 4400</td>
<td>The Brain and Sleep</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 4580</td>
<td>Mammalian Physiology</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 3280</td>
<td>Biopsychology of Learning and Memory (also BIONB 3280)</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>BIOMI 4170</td>
<td>Medical Parasitology (also VETMI 4310)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>BIOMI 4390</td>
<td>Molecular Basis of Human Disease (also BIOGD 4390)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>BIOEE 2740</td>
<td>The Vertebrates: Structure, Function, and Evolution</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>BIOGD 4870</td>
<td>Human Genomics</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>BIOMI 4170</td>
<td>Medical Parasitology (also VETMI 4310)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>NS 1150</td>
<td>Nutrition, Health, and Society</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>NS 1220</td>
<td>Nutrition and the Life Cycle</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 3150</td>
<td>Obesity and the Regulation of Body Weight (also PSYCH 3150)</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 3220</td>
<td>Maternal and Child Nutrition</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 3310</td>
<td>Physiological and Biochemical Bases of Human Nutrition</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 3410</td>
<td>Human Anatomy and Physiology</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 3610</td>
<td>Biology of Normal and Abnormal Behavior (also PSYCH 3610)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>NS 4210</td>
<td>Nutrition and Exercise</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 4310</td>
<td>Mineral Nutrition and Chronic Disease</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>NS 4410</td>
<td>Nutrition and Disease</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>NS 4750</td>
<td>Mechanisms Underlying Mammalian Developmental Defects (also BIOAP 4750)</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>NS 6140</td>
<td>Topics in Maternal and Child Nutrition</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 3220</td>
<td>Hormones and Behavior (also BIONB 3220)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 4250</td>
<td>Cognitive Neuroscience</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 4400</td>
<td>Human Evolution: Genes, Behavior, and the Fossil Record</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 2200</td>
<td>Early People: The Archaeological and Fossil Record (also ARKEO 2200)</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 3390</td>
<td>Primate Behavior and Ecology</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 4390</td>
<td>Topics in Biological Anthropology</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 1300</td>
<td>Human Evolution: Genes, Behavior, and the Fossil Record</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 3375</td>
<td>Evolutionary Theory and Human Behavior</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 3359</td>
<td>Primate Behavior and Ecology</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 3710</td>
<td>Human Paleontology</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>BIOMI 4170</td>
<td>Medical Parasitology (also VETMI 4310)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 4250</td>
<td>Cognitive Neuroscience</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 4270</td>
<td>Evolution of Language (also COGST 4270)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 4400</td>
<td>The Brain and Sleep</td>
<td>Fall.</td>
<td></td>
</tr>
</tbody>
</table>

**Human Evolution and Ecology**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTHR 3305</td>
<td>Anthropology of Parenting</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 3390</td>
<td>Primate Behavior and Ecology</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>ANTHR 4930</td>
<td>Topics in Biological Anthropology</td>
<td>Spring.</td>
<td></td>
</tr>
<tr>
<td>BIONB 3270</td>
<td>Evolutionary Perspectives on Human Behavior</td>
<td>Fall.</td>
<td></td>
</tr>
</tbody>
</table>

**Human Behavior**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYCH 3220</td>
<td>Hormones and Behavior (also BIONB 3220)</td>
<td>Fall.</td>
<td></td>
</tr>
<tr>
<td>PSYCH 3280</td>
<td>Biopsychology of Learning and Memory (also BIONB 3280)</td>
<td>Spring.</td>
<td></td>
</tr>
</tbody>
</table>
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 Urs Hall and at www.inequality.cornell.edu). The inequality minor is appropriate for students interested in government service, policy work, and related jobs in nongovernmental organizations (NGOs) as well as students who wish to pursue postgraduate 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 topics 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 (IRLE 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, 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 2600)
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 3950, FGSS 3500)
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)
Politics of Transnationalism (GOVT 6817)

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)
   - Economic Security (ECON 4510)
   - Employment Discrimination and the Law (ILRCB 6840)
   - Human Resource Economics and Public Policy (ILHRH 3600)
   - Diversity and Employee Relations (ILHRH 4630)
   - Social Welfare as a Social Institution (PAM 3830)
   - 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 (PAM 4730)
   - Social Policy and Social Welfare (CRP 4480/5480)
   - Policy Analysis: Welfare Theory, Agriculture, and Trade (AEM 6300, ECON 4500)

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 (ILRCH 6070)
     - Contemporary Moral Issues (PHIL 1450)
     - Global Thinking (GOVT 2947)
     - Modern Political Philosophy (PHIL 3460)
     - Feminism and Philosophy (FGSS/PHIL 2490)
     - Marx: An Overview of His Thought (ANTHR 3468/4668)
   - 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)
   - Economic Analysis of the Welfare State (ECON 4600, ILRLE 6420)
   - Families and Social Policy (HD 4560)
   - Health and Social Behavior (HD 4570, SOC 4570)
   - Public Policy and the African–American Urban Community (ASRC 4605)
   - Beliefs, Attitudes, and Ideologies (PSYCH 4800/6890)
   - Research on Education Reform and Human Resource Policy (ILHRH 6601)

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)
Politics of Transnationalism (GOVT 6817)
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)
   - Politics of Transnationalism (GOVT 6817)
   - Comparative Labor Movements in Latin America (ILRIC 4310)
   - 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)
Educational Innovations in Africa and the Diaspora (ASRC/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 5191, LSP 3190)
Health and Survival Inequalities DSOC/FGSS/SOC 4100)
Sociology of Health and Ethnic Minorities (DSOC/LSP 2200)
Prisons (GOVT 3141)
Racial and Ethnic Differentiation (PAM/SOC 3370)
Diversity and Employee Relations (ILRHR 4630)
Ethnicity and Identity Politics: An Anthropological Perspective (AAS 4790, ANTHR 4749)
Political Identity: Race, Ethnicity, and Nationalism (GOVT 6101)

B. Immigration and Ethnicity
Strangers and Citizens: Immigration and Labor in U.S. History (ILRHR 3020)
Immigration and the American Labor Force (ILRHR 4690)

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, ILRHR 3850)

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 12 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 (12 courses)

1. Introductory (two courses):
   INFO 1301 Introduction to Programming Web Applications
   INFO 1302 Introduction to Designing Web Applications
   Note: INFO 1301 and 1302 count together as one course.
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
   INFO 2950 Mathematical Methods for Information Science
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 Psychology of Social Computing

4. Information Systems (two courses):
CS 2110 Object-Oriented Programming and Data Structures
INFO 2500 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.

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 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 Communication
INFO 3650 Technology in Collaboration
PSYCH 3800 Social Cognition
PSYCH 4130 Information Processing: Conscious and Unconscious
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 2080 toward the Human-Centered Systems primary or secondary track requirements. At most, one of PSYCH 2050 or PSYCH 2080 can be counted toward the primary or secondary track requirements.

Information Systems
INFO 3300 Data-Driven Web Applications
INFO 3720 Explorations in Artificial Intelligence
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 Technology, Information, and Business 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

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:
• summa cum laude, 4.00 or above
• magna cum laude, 3.75 or above
• cum laude, 3.50 or above

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.
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 1301 Introduction to Programming Web Applications
Fall, weeks 1–7. 2 credits. Students must enroll in both INFO 1301 and 1302. For description, see INFO 1301 in CIS section.

INFO 1302 Introduction to Designing Web Applications
Fall, weeks 8–14. 2 credits. Students must enroll in both INFO 1301 and 1302. Prerequisite: successful completion of INFO 1301. For description, see INFO 1302 in CIS section.

INFO 2040 Networks (also CS 2800, ECON 2040, SOC 2120) (SBA-AS)
Spring. 4 credits. For description, see ECON 2040.

INFO 2140 Cognitive Psychology (also COGST 2140/6140, PSYCH 2140) (KCM-AS)
Fall. 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 1301 and 1302 strongly recommended. For description, see INFO 2300 in CIS section.

INFO 2310 Topics in Web Programming and Design
Fall, weeks 1–10. 1 credit. Prerequisite: INFO 2300.

INFO 2450 Psychology of Social Computing (also COMM 2450)
Fall, summer. 3 credits. For description, see COMM 2450.

INFO 2921 Inventing an Information Society (also AMST/ECE/ENGRD 2980, HIST 2920, STS 2921) (HA-AS)
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)
Spring. 3 credits. For description, see COMM 3200.

INFO 3300 Data-Driven Web Applications (also CS 3300)
Spring. 3 credits. Prerequisite: CS/ENGRD 2110. For description, see INFO 3300 in CIS section.

INFO 3450 Human-Computer Interaction Design (also COMM 3450)
Spring. 3 credits. For description, see COMM 3450.

INFO 3490 Media Technologies (also COMM 3490, STS 3491) (HA-AS)
Spring. 3 credits. Offered odd-numbered years. 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. For description, see STS 3551.

INFO 3561 Computing Cultures (also COMM/VISSST 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 in 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/VISSST 3660) (CA-AS)
Fall. 4 credits. Next offered 2009–2010. For description, see ARTH 3660.

INFO 3720 Explorations in Artificial Intelligence (also CS 3700)
Spring. 3 credits. Prerequisites: MATH 1110 or equivalent, an information science approved statistics course, and CS 2110 or permission of instructor. Next offered 2009–2010. For description, see INFO 3720 in CIS section.

INFO 3871 The Automatic Lifestyle: Consumer Culture and Technology (also STS 3871) (CA-AS)
Fall. 4 credits. Next offered 2009–2010. For description, see ARTH 3871.

INFO 4144 Responsive Environments (also ARTH 4144) (CA-AS)
Spring. 4 credits. Next offered 2009–2010. For description, see ARTH 4144.

INFO 4450 Seminar in Computer-Mediated Communication (also COMM 4450)
Fall. 3 credits. Prerequisites: COMM/INFO 2450. Next offered 2009–2010. For description, see COMM 4450.

INFO 4470 Social and Economic Data (also ILRLE 4470)
Spring. 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. Next offered 2009–2010. For description, see COMM 4500.

INFO 4850 Computational Methods for Complex Networks
Spring. 3 credits. Prerequisites: (2) CS 2950, ECON/INFO 2040, SOC 2090, or equivalent knowledge; CS 2110 or INFO 2300 or equivalent knowledge of basic programming. For description, see INFO 4850 in CIS section.

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
Fall. 4 credits. For description, see INFO 5150 in CIS section.

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 6002 Critical Technical Practices
INFO 6140 Cognitive Psychology (also COGST 6140, PSYCH 2140/6140)
Fall. 4 credits. For description, see PSYCH 6140.

INFO 6144 Responsive Environments (also ARTH 4144/6144)
Spring. 4 credits. Next offered 2009–2010. For description, see ARTH 4144.

INFO 6300 Advanced Language Technologies (also CS 6740)
Fall or spring. In 2008–2009, offered in fall. 3 credits. Prerequisites: permission of instructor. Neither CS/INFO 4500 nor CS 4740 are prerequisites. For description, see CS 6740 in CIS section.

INFO 6350 The Architecture of Large-Scale Information Systems (also CS 6350)
Spring. 4 credits. Required for the minor. Prerequisite: permission of instructor. For description, see CS 6350 in CIS section.

INFO 6470 Social and Economic Data (also ILRLE 4470)
Spring. 4 credits. Prerequisite: 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 6500 Language and Technology (also COMM 4500)
Spring. 3 credits. Prerequisite: COMM/INFO 2450 or permission of instructor. Next offered 2009–2010. For description, see COMM 4500.

INFO 6850 Computational Methods for Complex Networks
Spring. 3 credits. Prerequisites: (2) CS 2950, ECON/INFO 2040, SOC 2090, or equivalent knowledge; CS 2110 or INFO 2300 or equivalent knowledge of basic programming. For description, see INFO 4850 in CIS section.

INFO 9000 Independent Reading and Research
Fall, spring. 1–4 credits. Independent reading and research for undergraduates.
The International Relations (IR) minor is an interdisciplinary program for undergraduate students 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 pursuing 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 unfamiliarity 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.

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 2008–2009

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
AEC 4290 International Finance
AEM 4300 International Trade Policy
ECON 3610 International Trade Theory
ECON 3630 International Monetary Theory

Electives:
AEC 4540 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

For further details, see COMM 6500.

INFO 6450 Seminar in Computer-Mediated Communication (also COMM 6450)
INFO 6500 Language and Technology (also COMM 6500)
INFO 6648 Speech Synthesis (also LING 6648)
INFO 6850 The Structure of Information Networks (also CS 6850)
INFO 7090 IS Colloquium
INFO 7470 Social and Economic Data (also LIRLE 7400)
INFO 7900 Independent Research
INFO 9900 Thesis Research

INTERNATIONAL RELATIONS MINOR

Office: 190B Uris Hall, 255-7645; www.einaudi.cornell.edu/initiatives/ic.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 pursuing 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.

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 2008–2009

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
AEC 4290 International Finance
AEM 4300 International Trade Policy
ECON 3610 International Trade Theory
ECON 3630 International Monetary Theory

Electives:
AEC 4540 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

For further details, see COMM 6500.
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

Group 3: Transnational Processes and Policies

Core:
GOVT 2947/PHIL 1940 Global Thinking
GOVT/SOC 3937 Introduction to Peace Studies

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 5385/HIST 3880 Vietnamese Histories
ASIAN 3397/HIST 3950 Premodern Southeast Asia
ASIAN 4494/HIST 4921 India: Nation and Narration, History, Literature
ASIAN 6001/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

See “Department of Romance Studies.”
JAPANESE
See "Department of Asian Studies."

JAVANESE
See "Department of Asian Studies."

PROGRAM OF JEWISH STUDIES
D. I. Owen, director (Ancient Near Eastern History and Archaeology, Assyriology; Biblical History and Archaeology). L. Adebonojo (German-Jewish Literature and Culture), D. Bathrick (Holocaust Film Studies), 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-Eitznin (Early Judaism and Early Christianity), R. Hoffmann (Holocaust Studies), P. Hohendahl (German Literature), P. Hyams (Modern Jewish History), D. Lapar (Holocaust Studies), M. Migiel (Italian Literature). C. Monroe (Near Eastern Mediterranean Studies; Nautical Archaeology), L. Monroe (Hebrew Bible Studies). D. Polenberg (American-Jewish History), D. Powers (Islamic History and Law), E. Rhémaid (Jews in the Roman Empire), N. Scharf (Hebrew Language), D. Schwarz (Anglo-Jewish Literature), V. Shapiro (Russian-Jewish Literature), S. Shoer (Hebrew Language), D. Starr (Modern Hebrew and Arabic Literature; Critical Theory; Middle Eastern Film), P. Stevens (curator), S. M. Thoenoureua (Arabic Literature and Islamic Studies), J. Zorn (Biblical Archaeology). Emeritus: 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/jswt/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.
For description, see NES 1101–1102.

**JWST 1103 Elementary Modern Hebrew III (also NES 1103)**
Fall. 4 credits. N. Scharf.
For description, see NES 1103.

**JWST 1111 Introduction to Biblical Hebrew (also NES/RELST 1111)**
Fall. 3 credits. Next offered 2009–2010. L. Monroe.
For description, see NES 1111.

**JWST 2100 Intermediate Modern Hebrew (also NES 2100)**
Spring. 4 credits. N. Scharf.
For description, see NES 2100.

**JWST 2271 Yiddish Linguistics (also LING 2241)**
Spring. 4 credits. M. Diesing.
For description, see LING 2241.

**JWST 2350 Antisemitism and Crisis Modernity (also HIST 2350)**
Fall. 4 credits. Next offered 2009–2010. V. Caron.

**JWST 2622 Judaism from the Persian Period to the Rise of Islam (also CLASS 2634, NES/RELST 2622)**
Spring. 4 credits. L. Jovanovic.
For description, see NES 2622.

**JWST 2651 Holy War, Crusade, and Jihad in Judaism, Christianity, and Islam (also COML 2310, HIST 2691, NES/RELST 2651)**
Fall. 3 credits. Next offered 2009–2010. R. Brann.

**JWST 2661 Ships and Seafaring—Introduction to Nautical Archaeology (also ARKEO/NES 2661)**

**JWST 2662 Daily Life in the Biblical World (also ARKEO/NES/RELST 2662, LA 2520)**
Fall. 3 credits. J. Zorn.
For description, see NES 2662.

**JWST 2663 Introduction to Biblical History and Archaeology (also ARKEO/NES/RELST 2663)**
Fall. 3 credits. Next offered 2009–2010. J. Zorn.

**JWST 2668 Ancient Egyptian Civilization (also ARKEO/NES 2668)**
Spring 3 credits. C. Monroe.
For description, see NES 2668.

**JWST 2672 Imperialism and the History of the Modern Middle East (also NES 2672)**
For description, see NES 2672.

**JWST 2674 History of the Modern Middle East: 19th–20th Centuries (also GOVT 2747, HIST/NES 2674)**
Fall. 3 credits. Z. Fahmy.

**JWST 2675 The Religions of Ancient Israel (also ARKEO/NES/RELST 2675)**
For description, see NES 2675.

**JWST 2724 Introduction to the Hebrew Bible—Prophecy (also NES/RELST 2624)**
Fall. 3 credits. L. Jovanovic.
For description, see NES 2724.

**JWST 2793 Middle Eastern Cinema (also FILM 2930, NES 2793, VISST 2193)**

**JWST 2910 Modern European Jewish History 1789–1948 (also HIST 2910)**
Fall. 4 credits. S. Gutman.
For description, see HIST 2910.

**JWST 3101–3102 Advanced Intermediate Modern Hebrew (also NES 3101–3102)**
3101, fall; 3102, spring. 4 credits. N. Scharf.
For description, see NES 3101–3102.

**JWST 3103 Love, Wine, Death, and In Between (also NES 3103)**
Fall. 4 credits. S. Shoer.
For description, see NES 3103.

**JWST 3105 Conversational Hebrew (also NES 3105)**
Spring. 2 credits. Limited to 15 students. Prerequisite: NES 3102, 4100, or permission of instructor; non-native speakers only.

**JWST 3524/6524 Israeliite Prophecy (also RELST 3524, NES 3524)**
Spring. 4 credits. L. Monroe.
For description, see NES 3524.

**JWST 3619 Near Eastern Christianities, 50–650 CE (also HIST/NES/RELST 3619)**
Fall. 4 credits. K. Haines-Eitznin.
For description, see NES 3619.

**JWST 3661 Sumerian Language and Culture I (also ARKEO/NES 3661/6661, JWST 6661)**
Fall. 4 credits. D. I. Owen.
For description, see NES 3661.

**JWST 3665 Ancient Iraq II (also ARKEO/ NES 3665)**

**JWST 3666 History and Archaeology of the Ancient Near East (also ARKEO/NES 3666/6666, JWST 6666)**
Fall. 4 credits. D. I. Owen.
For description, see NES 3666.

**JWST 3697 Israeli-Palestinian Conflict (also GOVT/NES 3697, HIST/SOC 3970)**
Fall. 4 credits. R. Brann.
For description, see NES 3697.
JWST 3700 History of the Holocaust (also HIST 3700)

JWST 4100 Advanced Readings in Modern Hebrew (also NES 4100)
For description, see NES 4101.

JWST 4101 Modern Hebrew Literature (also NES 4101)
For description, see NES 4101.

JWST 4102 Biblical Hebrew Prose—Judges (also NES/RELST 4102)

JWST 4104 Hebrew Literature (also NES 4104)
Spring. 4 credits. D. Abusch.
For description, see NES 4104.

JWST 4170 History of Jews: Modern France (also HIST 4170)
Spring. 4 credits. Next offered 2009–2010. V. Caron.
For description, see HIST 4170.

JWST 4500 Maimonides and Averroes (also NES/RELST 4500, SPAN 4380)
For description, see NES 4500.

JWST 4580 Imagining the Holocaust (also COML 4380, ENGL 4580, GERST 4570)
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)
Spring. 4 credits. C. Monroe.
For description, see NES 4644.

JWST 4670 Wealth and Power in Early Civilizations (also NES 4670)
For description, see NES 4670.

JWST 4674 Topics in Modern European Intellectual and Cultural History (also COML 4741, HIST 4740)
Fall. 4 credits. D. LaCapra.
For description, see HIST 4740.

JWST 4738 Imagining the Mediterranean (also COML 4960, NES 4738)
Spring. 4 credits. G. Holst-Warhaft.
For description, see NES 4738.

JWST 4787 Hellenistic Jewish Literature (also CLASS 4605, NES/RELST 4787)
Fall. 4 credits. L. Jovanovic.
For description, see NES 4787.

JWST 4790 Spinoza and the New Spinozism (also COML/GERST 4090, QUBS/ARCH 4769)
Fall. 4 credits. G. Waite.
For description, see GERST 4090.

JWST 4903 Methods in the Study of the Ancient Near East (also NES 4903)
Spring. 4 credits. 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)
For description, see NES 6112.

Courses not offered 2008–2009
JWST 2648 Introduction to Classical Jewish History (also NES/RELST 2648)
JWST 3571 A Mediterranean Society and Its Culture: The Jews under Classical Islam (also COML/NES/RELST 3571)
JWST 4440–4441 Aramaic (also NES 4440–4441)
JWST 4628 Gnosticism and Early Christianity (also NES/RELST 4628)
JWST 4749 Rescreening the Holocaust (also COML 4530, FILM/RELST 4500, GERST 4490)

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.

The John S. Knight Institute helps to coordinate 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/Sophomore Seminar Program, and writing classes in the teaching of writing. More than 30 academic departments and programs participate in the program. Each semester’s First-Year Writing Seminars are described on the web at http://fwxs.arts.cornell.edu.

To ensure that students will enjoy the benefits of small writing classes, First-Year Writing Seminars are limited to no more than 17 students. 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 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.

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 http://fwxs.arts.cornell.edu.

To ensure that students will enjoy the benefits of small writing classes, First-Year Writing Seminars are limited to no more than 17 students. 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 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 John S. Knight Institute helps to coordinate 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 programadministers writing seminars for first-year and upperclass students, discipline-based seminars in its Writing in the Majors/Sophomore Seminar Program, and writing classes 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—prove that, at its best, is characterized by clarity, coherence, intellectual force, and stylistic control. All seminars pursue this common aim through small classes, with a maximum of 17 students, 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.
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 http://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 “War, Peace, Terror, and the Law,” “Making the News,” “The Reflective Essay,” “Hollywood Babylon,” and “Rights, Democracy, and the Courts.” 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-intensive 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, these courses 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, and 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 enrollment of more 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 200 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.

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 cover curricular issues 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 they 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 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
Fall, winter, spring, 3 credits. Designed to provide historical, cultural, and literary contexts for the study of English language use in the university. Open to students in any college.

WRIT 1139 Special Topics in Writing
Fall and spring, 3 credits. Cannot fulfill writing or distribution requirements. Prerequisite: graduate standing; permission of instructor. S–U grades only.

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. See “Department of Asian Studies.”

WRIT 7103 Work in Progress
Fall and spring. 3 credits. Limited to 10 students per sec. Prerequisite: graduate standing and 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)
LATIN AMERICAN STUDIES PROGRAM

190 Uris Hall

Robert Blake, Animal Science, Interim Director, Latin American Studies; Lourdes Benera, City and Regional Planning; David Block, Library; Bruno Bosteels, Romance Studies; Debra Ann Castillo, Romance Studies; Comparative Literature; Maria Lorena Cook, ILL, Collective Bargaining, Law and History; Raymond Craib, History; Martin De Santos, Development Sociology; Maria Fernandez, History of Art; Gary Fields, International Labor Relations; Economics; Maria Antonia Garcés, Romance Studies, Maria Cristina García, History; Frederic Gleach, Anthropology; William W. Goldsmith, City and Regional Planning; Angela Gonzalez, Development Sociology; John S. Henderson, Anthropology; Luz Horne, Romance Studies; Eduardo Inigo-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; Ken Roberts, Government; Eloy Rodriguez, Plant Biology; José Maria Rodriguez-Garcia, Romance Studies; Mary Roldan, History; Jeannine Routier-Pucci, Romance Studies; Arturo Sanchez, City and Regional Planning; Elvira Sanchez-Blake, Romance Studies; Vilma Santiago-Hirzarry, Anthropology; Rebecca Stoltzfus, Nutrition; Stephen Younger, Human Ecology Nutritional Science.

Cornell’s Latin American Studies Program (LASP) was founded in 1961 with funds from the Mario Einaudi Center for International Studies and a major grant from the Ford Foundation. The National Defense Education Act (CNDEA) Language and Area Center established LASP in 1966 as one of the nation’s premier Latin American centers. Today, the Latin American Studies Program provides a focus for all activities oriented toward Latin America on the Cornell campus. Latin Americanists are active in most of Cornell’s colleges and schools, with such diverse strengths as the languages and literatures of the area, agricultural sciences, city and regional planning, anthropology, history, economics and the other social sciences. It is the purpose of the program to stimulate teaching by establishing contacts with Latin American universities and institutions, supporting research through grants to faculty members and graduate students, and sponsoring visiting scholars from Latin America. LASP offers a minor in Latin American Studies for undergraduate students and a graduate minor for graduate students.

Undergraduate Minor

To complete an undergraduate minor in Latin American Studies, students must earn a minimum of 15 credits in Latin American Studies. Latin American content courses not on the list may be approved by petition only. To satisfy the requirements of the minor, undergraduates must select courses from at least three fields and must include at least one course at the advanced level. Language instruction below the 3000 level may not be counted toward the requirement. However, language facility in Spanish, Portuguese, or Quechua must be demonstrated by successfully completing SPAN 2190, PORT 2190, QUECH 2190, or the equivalent.

Courses


[LATA 2150 The Tradition of Rupture (also SPAN 2150) Fall. 4 credits. J. Rodriguez-Garcia and staff. For description, see SPAN 2150.]

[LATA 2170 Readings—Medieval/Early Mod Sp (also SPAN 2170) Fall. 4 credits. M. A. Garcés. For description, see SPAN 2170.]

[LATA 2200 Perspectives on Latin America (also SPAN 2200) Fall. 3 credits. E. Paz-Soldán and Director, Latin American Studies Program. For description, see SPAN 2200.]

[LATA 2450 Drugs: People, Policies, Politics (also HIST 2450) Fall. 4 credits. Next offered 2009–2010. M. Roldan.]

[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 For description see SPAN 3020.]

[LATA 3060 Modern Mexico (also HIST 3060) Spring. 4 credits. Next offered 2009–2010. R. Craib.]

[LATA 3211 Forging Nations (also HIST 3120) Fall. 4 credits. Next offered 2010–2011. M. Roldan.]

[LATA 3292 Comparative Politics of Latin America (also GOVT 3292) Fall. 4 credits. K. Roberts. For description, see GOVT 3292.]

[LATA 3300 Crosscurrents of Challenge and Change in Contemporary Latin America (also ANTHR 3431, HIST 3331) Fall. 4 credits. M. Roldan. Focuses on major issues facing Latin American societies from the early 20th century to the present. We will examine the varied political, social, cultural, and economic responses that emerged to challenges such as: modernization and modernity; mass politics and populism, state repression and authoritarian rule; market reforms and globalization; the narcotics economy and drug wars; urbanization and human displacement; human rights violations; and new social and political movements.

[LATA 3390 Political Economy of Mexico (also ILRIC 3390) Spring. 4 credits. M. Cook. For description, see ILRIC 3390.]

[LATA 3550 Ancient Mexico and Central America (also ANTHR/ARKEO 3255) Fall. 4 credits. J. Henderson. For description see ANTHR 3255.]

[LATA 3680 Modern and Contemporary Latin American Art (also ARTH 3680, LSP 3551) Spring. 4 credits. M. Fernandez. For description, see ARTH 3680.]

[LATA 3710 Cuba: Search for Development Alternatives (also CRP 371) Fall. 3 credits. B. Lynch. For description, see CRP 3710.]

[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. R. Blake For description see IARD 4010.]

[LATA 4050 U.S.–Cuba Relations (also AMST/HIST/LSP 4050/6050, LATA 6050) Fall. 4 credits. Next offered 2009–2010. M. C. Garcia.]

[LATA 4240 Art and Politics in 20th-Century Latin America (also HIST 4240) Fall. 3 credits. M. Roldan For description see HIST 4240.]

[LATA 4260 Social Movements in Latin America (also GOVT 4264/6264, LATA 6260) Fall. 4 credits. K. Roberts. For description, see GOVT 4264.]

[LATA 4310 Farmworkers (also LSP 4310, HIST 4310) 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. R. Blake. For description IARD 4940.]

[LATA 4960 International Internship in Latin America (also IARD 4960) All semesters. 1–6 credits. R. Blake. For description see IARD 4960.]

[LATA 4970 Independent Study in LATA (also IARD 4970) All semesters. 1–3 credits. R. Blake. For description see IARD 4970.]

[LATA 5190 Urban Theory and Spatial Development (also CRP 5190) Spring. 3 credits. W. W. Goldsmith. For description, see CRP 5190.]

See “Department of Asian Studies.”

For description, see IARD 4940.
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 2590, 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 3980** Latina/o Popular Culture (also AMST 3981, ENGL 3780)

**LSP 4130** Classics of Latina/o Literature (also SPAN 4130)

**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 2500** Latino Communities (also AMST/ DSOC 2300)

**LSP 2721** Anthropological Representation: Ethnographies of Latino Culture (also AMST/ANTHR 2721)

**LSP 3550** Latinos, Law, and Identity (also AMST/DSOC 3550)

**LSP 3750** Comparative U.S. Racial and Ethnic Relations (also AMST/DSOC 3750)

**LSP 3760/6760** Latino/Latin American Cities (also CRP 3760/6760)

**LSP 3777** The United States (also AMST/ ANTH 3777)

**LSP 3950/6950** Immigrant Entrepreneurship (also CRP 3850.04/5850.04)

**LSP 4032** Immigration and Politics (also AMST/GOVT 4032)

**LSP 4510/6310** Farmworkers (also HIST 4510/6310, ILRCB 4020)

**LSP 4510** Multicultural Issues in Education (also AMST/EDUC 4510)

**LSP 4610** Identity: Race, Ethnicity, and Nationalism (also GOVT 4611)

**LSP 6424** Ethnoracial Identity in Anthropology, Language, and Law (also ANTHR 6424, LAW 7251)

**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)
- **ART 2170** Art and the Multicultural Experience

**Graduate Minor**

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 plus two advanced courses in Latino Studies and work intensively with a faculty member outside of their major field. In lieu of available courses, the student and minor field advisor may design a special project that culminates in a paper given at a conference or for publication. Each special project requires the approval of the director of graduate studies for the minor field. Students wishing to pursue the graduate minor field in Latino Studies must file an application at the Latino Studies Program, 434 Rockefeller Hall.

**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)
- **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)
- **ART 2170** Art and the Multicultural Experience
LSP 1301 Introduction to World Music: Africa and the Americas (also MUSIC 1301)
Spring. 3 credits. 1-hour disc. S. Pond. For description, see MUSIC 1301.

LSP 2010 Latinos in the United States (also DSOC/SOC 2650)
Spring. 4 credits. Variable. H. Velez. For description, see SOC 2650.

LSP 2020 Spanish for English–Spanish Bilinguals (also SPAN 2000)
Spring. 4 credits. N. Maldonado-Mendez. 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)
Fall. 4 credits. M. C. Garcia. For description, see HIST 2250.

[LS 2300] Latino Communities (also AMST/DSOC 2300)

LSP 2400 Intro to Latino Literature (also AMST 2401, ENGL 2400)
Fall. 4 credits. M. P. Brady. For description, see ENGL 2400.

[LSP 2460] Contemporary Narratives by Latina Writers (also FGSS/SPAN 2460)

[LSP 2600] Latinos in the United States: Colonial to 1898 (also AMST 2599, HIST 2600)

[LSP 2610] Latinos in the United States: 1898 to the Present (also AMST/HIST 2610)

[LSP 2721] Anthropological Representation: Ethnographies on Latino Culture (also AMST/ANTHR 2721)

LSP 3130 Spanish Writing Workshop for Advanced English–Spanish Bilinguals (also SPAN 3130)
Spring. 1 credit. Prerequisite: permission of instructor. Students must be registered concurrently with LSP 2020. N. Maldonado-Mendez. For description, see SPAN 3130.

[LSP 3191] Racial and Ethnic Politics (also AMST/GOVT 3191)

LSP 3550 Latinos, Law, and Identity (also AMST/DSOC 3550)
Spring. 3 credits. R. Mize. For description, see DSOC 3550.

LSP 3551 Modern and Contemporary Latino/Latin American Art (also ARTH 3550, LATA 3680)
Fall. 4 credits. 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)
Fall. 4 credits. V. Santiago-Irizarry. For description, see ANTHR 3777.

LSP 3950/6590 Immigrant Entrepreneurship, Markets, and the Restructured U.S. City: The Latino Case (also CRP 3950.04/5950.04)
Spring. 3 credits. A. Sanchez. For description, see CRP 3950.04/5950.04.

LSP 3980 Latina/o Popular Culture (also AMST 3981, ENGL 3980)
Spring. 4 credits. M. P. Brady. For description, see ENGL 3980.

LSP 4032 Immigration and Politics (also AMST/GOVT 4032)
Spring. 4 credits. M. Jones-Correa. For description, see GOVT 4032.

[LSP 4050/6050] U.S.–Cuba Relations (also AMST/HIST/LATA 4050/6050, LATA 4050)

LSP 4130 Classics of Latina/o Literature (also SPAN 4130)
Fall. 4 credits. D. Castillo. For description, see SPAN 4130.

LSP 4200–4210 Undergraduate Independent Study
Fall and spring. 2–4 credits. Prerequisite: permission of instructor. Guided independent study.

LSP 4310–4313 Farmworkers (also CRP 3850.72/5850.72, HIST 4310/6310, ILRCB 4020) (HA-AS)
Spring. 4 credits. Team taught. Faculty supervisor: R. Craig. Interdisciplinary, team-taught course on the world of rural migrant labor. Weekly sessions taught by faculty members from across campus combine short lectures and discussion of assigned readings. 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 include analytical essays, a final paper, and participation in a service-learning project that are arranged in conjunction with the instructors.

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)
Fall. 4 credits. Prerequisite: permission of instructor. M. C. Garcia. For description, see HIST 4850.

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)
Spring. 4 credits. V. Santiago-Irizarry. For description, see ANTHR 6424.

LAW AND SOCIETY
Co-directors: M. Lynch (science and technology studies), 302 Rockefeller Hall, 255-7294, mel27@cornell.edu, and R. Lieberwitz (ILL), 287A Ives Hall, 255-3289, rlf@cornell.edu

Advisers: G. Alexander (law), D. Dunning (psychology), M. Evangelista (government), G. Hay (law), B. Hendrix (government), S. Hilgarter (science and technology studies), P. Hyams (history), M. Katzenstein (government), K. Miller (philosophy), M. Moody-Adams (philosophy), M. B. Norton (history), D. Powers (Near East studies), A. Riles (law), V. Santiago-Irizarry (anthropology), S. Shiffrin (law)

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. In addition to a transcript notation, students who complete the requirements will receive a certificate and can include the law and society minor on a résumé or graduate school application.

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 listserve 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 from each of 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 3151 and PSYCH 2650 particularly relevant.

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
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.

To facilitate tracking of courses taken and events attended, a printable student progress record can be accessed electronically or obtained as a preprinted form from the EPL office. Information collected on this form will be needed for the completion plan due by the end of the student’s next-to-last semester before graduation.

The law and society minor is administered by the Ethics and Public Life (EPL) office. For more information, contact the EPL administrative assistant at 240 Goldwin Smith Hall, epl@cornell.edu, 255-8515.

**Approved Courses**

Select one course from each of four different categories:

- **American Constitutional Development** (AMST/HIST 3180)
- **American Political Development in the 20th Century** (GOVT 4041)
- **American Political Thought from Madison to Malcolm X** (AMST/GOVT 3665, HIST 3160)
- **Children and the Law** (HD 2330)
- **Communication Law** (COMM 4280)
- **Constitutional Aspects of Labor Law** (ILRCB 6890)
- **Employment Discrimination** (HADM 4485)
- **Employment Discrimination and the Law** (ILRCB 6840)
- **Environmental Law** (CRP 4510)
- **Environmental Politics** (CRP 3800)
- **History of the U.S. Senate in the 20th Century** (HIST 4030)
- **International Law** (GOVT 3898)
- **Labor and Employment Law** (ILRCB 2010)
- **New York State Government Affairs: Capital Semester in Albany** (PAM 3920)
- **Politics and Policy: Theory, Research, and Practice** (AMST/GOVT/PAM 4998)
- **Politics of Nations Within** (GOVT 3645)
- **The American Presidency** (GOVT 3161)
- **The Nature, Functions, and Limits of Law** (GOVT 3131)
- **The Old English Laws** (ENG 4190, HIST 3311, NTRES 3310)
- **U.S. Congress** (AMST/GOVT 3181)
- **Law and Policy**
  - **Arbitration** (ILRCB 6020)
  - **Comparative Social Stratification** (DSOC 3700, SOC 3710)
  - **Corporations, Shareholders, and Policy** (PAM 3340)
  - **Drugs and Society** (SOC 2460)
  - **Economics of Consumer Laws and Protection** (PAM 3410)
  - **Environmental Governance** (BSOC/STS 3311, NTRES 3310)
  - **Government and Public Policy: An Introduction to Analysis and Criticism** (GOVT 4281)

- **International Conservation** (NTRES 4340)
- **Knowledge, Technology, and Property** (STS 4111)
- **Prisons** (AMST/GOVT 3141)
- **Problems in Contemporary Society** (SOC 2070)
- **Public Finance: Resource Allocation and Fiscal Policy** (ECON 3360)
- **Public Finance: The Microeconomics of Government** (ECON 3350)
- **Public Policy and African-American Urban Community** (ASRC 4605)
- **Schooling, Racial Inequality, and Public Policy in America** (SOC 3570)
- **Social and Political Context of American Education** (EDUC 2710)
- **Social Inequality** (SOC 2208)
- **Social Movements in American Politics** (AMST/GOVT 3021)
- **Social Policy** (PAM 4730)
- **Social Policy and Social Welfare** (CRP 4480/5480)
- **Law and Society**
- **Afro-American Social Political Thought** (ASRC 2601)
- **Asian American Politics and Public Policy** (AAS 3901)
- **Ethnocranial Identity in Anthropology, Language, and Law** (ANTHR/LSP 6424)
- **Farmworkers** (CRP 3850, HIST/LSP 4310)
- **Feminism and Philosophy** (PHIL 2490)
- **Global Justice** (GOVT 3685, PHIL 3470)
- **Global Thinking** (GOVT 2947)
- **Inequality, Diversity, and Justice** (CRP 2930)
- **Intro to Peace Studies** (GOVT 3937)
- **Latinos, Law, and Identity** (AMST 3559, DSOC 3550)
- **Law, Crime, and Society in Early Modern Europe** (HIST 3730)
- **Marriage and Sexuality in Medieval Europe** (FGSS/HIST/RELST 3680)
- **Race and Politics in 20th-Century America** (AMST 3231)
- **Racial and Ethnic Politics in the United States** (AMST/GOVT/LSP 3191)
- **Sex, Power, and Politics** (GOVT 3043)
- **Sexuality and the Law** (FGSS 4610, GOVT 4625)
- **Social Welfare as a Social Institution** (PAM 3830)
- **The Court, Crime, and the Constitution** (HIST 2020)
- **The Death Penalty** (LAW 4051)
- **Urban Transformations in the Global South** (CRP 4740)
- **Women in American Society, Past and Present** (AMST/FGSS/HIST 2730)
LESBIAN, BISEXUAL, AND GAY STUDIES


The field of Lesbian, Bisexual, and Gay (LGB) Studies is devoted to the interdisciplinary study of the social construction of sexuality. LGB 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 LGB 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 LGB 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 LGB 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 institutions of exclusive heterosexuality. Students selecting their four courses from the LGB Studies subset must identify their minor as either LGB Studies or heterosexuality. Students selecting their four courses from the LGB Studies subset must thereby use the same courses for both the LGB Studies 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 LGB 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 LGB 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 institutions of exclusive heterosexuality. Students selecting their four courses from the LGB Studies subset must identify their minor as either LGB Studies or heterosexuality. Students selecting their four courses from the LGB Studies subset must thereby use the same courses for both minors.

Students interested in the LGB Studies minor should contact the Lesbian, Bisexual, & Gay 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. Staff.
For description, see ANTHR 3421.

[ENGL 2760 Desire (also COML/FGSS 2760, THETR 2760)
Spring. 4 credits. Letter grades only. Next offered 2010–2011. E. Hanson.]

[ENGL 3550 Decadence (also COML/FGSS 3550)
4 credits. Next offered 2009–2010. E. Hanson.]

[ENGL 4780 Intersections in Lesbian Fiction (also AMST 4780, FGSS 4770)

[ENGL 6030 The Question of Feminist and Queer Criticism in Premodern Studies (also FGSS 6030)

[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. Staff.
For description, see FGSS 2010.

FGSS 3702 Desire and Cinema (also COML/ENGL 3702)
Spring. 4 credits. E. Hanson.
For description, see ENGL 3702.

FGSS 4000 Senior Seminar in Feminist, Gender, and Sexuality Studies
Fall. 4 credits. K. McCullough.
For description, see FGSS 4000.

FGSS 4791 Transgender and Transexuality (also ENGL 4791)
Fall. 4 credits. M. Raskolnikov.
For description, see ENGL 4791.

[GOVT 4625 Sexuality and the Law (also AMST 4265, FGSS 4610)

[GOVT 7625 Sexuality and the Law (also FGSS 7620)

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)

[HIST 2730 Women in American Society, Past and Present (also FGSS 2730)

[HIST 3680 Marriage and Sexuality in Medieval Europe (also FGSS/RELST 3680)

[HIST 4160 Gender and Sex in Southeast Asia (also ASIAN 4416, FGSS 4160)
Fall. 4 credits. Next offered 2009–2010. T. Loos.]

[THETR 4200/6200 Parody (also FGSS 4270/6370)

[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)
LINGUISTICS
ling.cornell.edu

J. Bowers, acting chair (206 Morrill Hall); M. Weiss, director of graduate studies (218 Morrill Hall); W. Harbert, director of undergraduate studies (210 Morrill Hall); D. Abusch, W. Browne, A. Cohn, M. Diesing, S. Hertz, A. Miller, A. Nussbaum, M. Rooth, C. Rosen, M. Wagner, J. Whitman, D. Zec.

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 Kaye Harbert (210 Morrill Hall, 255-8441, web2@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 (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 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, staff.

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. C. Rosen.

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 are 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 continue 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. A. Nussbaum.

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. B. Bienvenue.

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. Next offered 2009–2010.
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)]
W. Harbert.
Traces English from Chaucer to the present, including the development of standard English dialects and the rise of English as a world language.

[LING 2236 Introduction to Gaelic]
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 2241) (SBA-AS)
Spring. 3 credits. No previous knowledge of Yiddish required. 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 2009–2010.
S. McConnell-Ginet.
Explores connections between language (use) and gender/sex systems, addressing such questions as the following: How do sex and gender affect the ways we speak, the ways we interpret and evaluate speech? How do sociocultural differences in women's and men's roles affect their language use, their relation to language change? What is meant by sexist language? How does conversation structure the social worlds of women and men? Readings draw from work in linguistics, anthropology, philosophy, psychology, literature, and general women's studies and feminist theory.

LING 2246/5546 Minority Languages and Linguistics (SBA-AS)
Fall. 4 credits. Graduate students register under LING 5546. W. Harbert.
Examines minority languages from linguistic, social, and political perspectives, including such issues as language death, language maintenance, the 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. 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. M. Weiss.
An introduction to the phonology, morphology, and syntax of Proto-Indo-European and the chief historical developments of the daughter languages.

LING 2270 Truth and Interpretation (also COGST/PHIL 2700) (KCM-AS)
Fall. 4 credits. B. Weatherston.
For description, see PHIL 2700.

LING 2285/5585 Linguistic Theory and Poetic Structure (also ENGL 2960/5850) (LA-AS)
Fall. 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. 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. J. Brugman.
Introduction to the study of the physical properties of human speech sounds, including production, acoustics, and perception of speech. Emphasis throughout the course is placed on forming and testing hypotheses.

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. M. Diesing.
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. D. Abusch.
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 relationships 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. 2 credits. 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. Heimisdóttir.
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 Edda poetry. 3316: Extensive reading of Old Norse texts, among them selections from some of the major Icelandic family sagas: Njáls 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, fall; 3322, spring. 4 credits each semester. Prerequisites: for LING 3321, LING 1101, or equivalent and qualification in any Romance language; for LING 3322, LING 3521, or permission of instructor. Next offered 2010–2011. C. Rosen.
LING 3332 Philosophy of Language (also PHIL 3710)
Fall. 4 credits. M. Elkhun.
For description, see PHIL 3710.

LING 3333 Problems in Semantics (also COGST 3330) (KCM-AS)
Spring. 4 credits. Prerequisite: logic or semantics course or permission of instructor. Next offered 2009–2010. Staff.
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 2009–2010. 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 4400 Language Typology (KCM-AS)
Spring. 4 credits. Prerequisite: LING 1101. C. Rosen.
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 formulate 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 3502 or equivalent; for LING 4402, LING 4401 or permission of instructor. Fall, A. Cohen; spring, D. Zec.
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 syllable structure of tongue 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 3503; for LING 4404, LING 4403 or permission of instructor. Fall, M. Diesing; spring, R. Katzar.
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)
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 4410 Linguistic Structure of Japanese (also ASIAN 4411, JAPAN 4410) @ (HA-AS)
Introduction to the linguistic study of Japanese, with an emphasis on morphology and syntax.

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 2009–2010. 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)
Phonological, morphological, and syntactic developments from Old Russian to modern Russian.

LING 4419 Phonetics I (KCM-AS)
Fall. 4 credits. Prerequisite: LING 3501 or permission of instructor. S. Hertz.
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)
Continuation of Phonetics I, providing a more detailed survey of some areas in acoustics 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 expression 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. M. Rooth.
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 change in an information state.

LING 4423 Morphology (KCM-AS)
Fall. 4 credits. Prerequisite: LING 1101 or permission of instructor. D. Zec.
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 4420, CS 3470) (MQR)
Fall. 4 credits. Recommended: CS 2042. Staff.
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 2510, or permission of instructor. 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. W. Browne.
LING 4428/6628 Connectionist Psycholinguistics (also COGST 4280, PSYCH 4280/6280)
Fall. 3 credits. 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 2009–2010. 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 4431 Structure of an African Language (KCM-AS)]
Spring. 4 credits. Prerequisite: LING 1101 or permission of instructor. Next offered 2010–2011. Staff.
Survey of the structure of Southern African Khoesan languages in light 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 2009–2010. J. Whitman.
Introduction to the premodern Korean language. Focuses on the earliest banged 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)]
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 2009–2010. B. Lust.
For description, see COGST 3370.

LING 4441 Introduction to Germanic Linguistics (also GERST 4410) (KCM-AS)
Spring. 4 credits. Prerequisite: LING 1101 or permission of instructor. W. Harbert.
Survey of major issues in historical Germanic linguistics.

[LING 4443 Linguistic Structure of Russian (also RUSSA 4403) (KCM-AS)]
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 2009–2010. B. Lust.
For description, see COGST 4500.

LING 4451 Greek Comparative Grammar (also GREEK 4411) (KCM-AS)
Fall. 4 credits. A. Nussbaum.
For description, see GREEK 4411.

[LING 4452 Latin Comparative Grammar (also LATIN 4452) (KCM-AS)]
For description, see LATIN 4452.

[LING 4453 Structure of Latin (also LATIN/ROMS 4452) @ (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.
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)]
For description, see GREEK 4455.

[LING 4456 Archaic Latin (also LATIN 4456) (LA-AS)]
For description, see LATIN 4456.

[LING 4457 Hellenic Philology (also GREEK 4457) @ (LA-AS)]
For description, see GREEK 4457.

[LING 4459 Mycenaean Greek (also GREEK 4459) (LA-AS)]
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. M. Rooth.
For description, see CS 4740.

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 5531 Topics in Cognitive Studies (also COGST/BION/PSEYCH 5310)]
For description, see COGST 4310.

LING 6600 Field Methods
Spring. 4 credits. Prerequisites: LING 4401 and 4403 or permission of instructor. A. Cohn and R. Katzir.
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 2009–2010. Staff.
Selected topics in current phonological theory.

[LING 6602 Topics in Morphology]
Fall. 4 credits. Prerequisites: LING 4401 or 4403 or permission of instructor. Next offered 2009–2010. Staff.
Selected topics in current morphological theory.

LING 6604 Research Workshop
Fall. 2 credits. Requirement for third-year linguistics graduate students. S–U grades only. A. Cohn.
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.

LING 6615 Topics in Semantics
Fall. 4 credits. Prerequisite: LING 4421 or permission of instructor. D. Abusch and 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. R. Katzir.
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 2009–2010. 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 2010–2011. Staff.
System, a powerful software system for investigating phonology and phonetics through speech synthesis. The course is meant for graduate students and advanced undergraduate students in linguistics, but may also be of interest to students in psychology, computational linguistics, computer science, and cognitive studies.
MATH 011 becomes 1011
MATH 012 becomes 1012,
MATH 013 becomes 1300,
MATH 015 becomes 1105,
MATH 016 becomes 1106,
MATH 019 becomes 1009.

Advanced Placement
Freshmen who have had some calculus should carefully read "Advanced Placement," p. 7.

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 a major 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 2250–2240 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. For students graduating in 2010 or later, a C– or better in a 3- or 4-credit computer programming course is also required for acceptance to the major. Eligible courses include: CS 1110, 1112, 1113, 1114, and 2110.

Requirements
Students must complete nine courses to fulfill the following three requirements for the mathematics major. (Students graduating in 2009 or earlier must also complete a 3- or 4-credit computer programming course. Eligible courses include: CS 1110, 1112, 1113, 1114, and 2110.) 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. Major advisors can alter these requirements upon request from an advisee, provided the intent of the requirements is met. In particular, many suitable graduate courses are not listed here. No course may be used to satisfy more than one requirement for the math major.

1. Two courses in algebra.* Eligible courses are: MATH 4310 or 4340, MATH 4320 or 4340, MATH 4370, MATH 4320 or 3560.
2. Two courses in analysis. Eligible courses are: MATH 3110, 3210, 3240, 4130, 4140, 4180, 4200, 4220, 4240, 4250 (also CS 4210), 4260 (also CS 4220), 4280.
3. Five further high-level mathematical courses. Two-credit courses count as half courses. 5000-level MATH courses do not normally count toward the major. In rare cases, exceptions are made. Students should consult their advisors. 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.
   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 2200, 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 (vi) and (vii) 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, 4812, 4820, 4830, 4850, and 4860.

c. Concentration in Economics:
   Five additional courses from (v) and (vi) below, as follows: one course from (v) three courses from (vi), and a fifth course from any of (v) or (vi).
   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, 6000, 6100, 6130, 6140, 7170, 7180, 7490, 7560. Only two of the econometrics courses (3200/6200, 3250, 3270, 7490, 7560) are allowed. Students graduating in May 2009 or earlier may also use ECON/AEM 4500.
   vii. Courses in operations research with significant mathematical content and dealing with material of interest in economics. Eligible courses are: ORIE 3300, 3310, 4320, 4330, 4350, 4360, 4520, 4540, 4850, and 5640.

d. Concentration in Mathematical Biology:
   Five additional courses from the following list of courses with overlapping content at the end of the introduction:
   viii. Biology courses that have mathematical content or provide background necessary for work at the interface between biology and mathematics. Eligible courses are: BIO/E**/MATH 3620, BIO/E**/MATH 4600, BIO/N 4220, BTRY 4080*, 4090*, 4820, 4830, 4840. Students graduating in May 2009 or earlier may also use BION 4810, 4840, 4870, BION 3500.
   ix. Mathematics courses numbered above 3000. Particularly appropriate are MATH 4200 and 4710.*

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), 4260 (also CS 4220), 4280, 4310 or 4320, 4320 or 4340, 4370, 4410, 4420, 4500, 4510, 4520, 4530, 4540, 4550, 4710*, 4720*, 4810, 4830, 4850, 4860.

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.

Concentration in Statistics:
   Five additional courses from (xiv) and (xv) below, which include both from (xv) and at least two from (xiv).

xv. MATH 4710* and 4720.*

*See the list of courses with overlapping content at the end of the introduction.
Courses in other departments with significant content in probability and statistics, complementing (xiv). Eligible courses are: BTRY 3020, 4820, 6020, 6030, 6040, ORIE 3510, 4520, 4540, 4600, 4630, 4710 (half course), and 4740; ILRST 3120, 4100, and 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 be looking for an 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/~undergrad/Teaching.

Studying Mathematics Outside the Major
The College of Arts and Sciences and the Department of Mathematics offer no minor or concentration in mathematics for students who are not math majors. However, some other scientific departments in the college offer, within their own majors, concentrations in mathematics and mathematics-related fields. A student interested in such a concentration should consult the director of undergraduate studies of his or her major department.

The College of Engineering offers a minor in applied mathematics that is open to any undergraduate in that college. The minor is sponsored jointly by the Department of Mathematics and the Department of Theoretical and Applied Mechanics, and is administered by the latter department. Interested students should contact the Department of Theoretical and Applied Mechanics.

Undergraduates who wish to pursue serious study of mathematics are encouraged to consult with the department. The department's director of undergraduate studies and other faculty can provide assistance in selecting appropriate areas of study and individual courses.

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 1110–1120 and continue with MATH 2210–2220 or 2210–2240 (MATH 1910 may be substituted for MATH 1110).

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 mathematics for 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.

5. 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 calculus may 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.

1. 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.)

2. 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, 2510, 2940
MATH 3520, 3560
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, 2240, 2510, 2930, 2940
Mathematics Education: 4080, 4510
History of Mathematics: 4050
General and Liberal Arts Courses: 1300, 1340, 1350, 1710, 3040, 4010, 4080
Analysis: 3110, 3210, 4130, 4140, 4180
Algebra and Number Theory: 3320, 3360, 4310, 4520, 4530, 4540, 4570
Combinatorics: 4410, 4420, 4550
Geometry and Topology: 3560, 4500, 4510, 4520, 4530, 4540
Probability and Statistics: 1710, 4710, 4720, 4740
Mathematical Logic: 2810, 3840, 4810, 4820, 4860
Applied Analysis and Differential Equations: 3250, 3620, 4200, 4220, 4240, 4250, 4260, 4280
MATH 1000 Calculus Preparation
Fall. 2 transcript credits only; cannot be used toward graduation. 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 pre-lab 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 pre-lab 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 pre-lab 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 pre-lab 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 1099, or BTRY 1150. 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. 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. 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)
Fall, spring. 4 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, spring, summer. 3 credits. Prerequisite: three years high school mathematics. Examines classical and modern methods of message encryption, decryption, and cryptoanalysis. 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 of 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 Henselberg 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. 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.
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.
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 2510.
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. 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: MATH 2210.
Topics include vector fields, line integrals, differential forms and exterior derivative, work, flux, and density forms; integration of forms over parameterized domains; and Green's, Stokes', and divergence theorems.

**MATH 2240 Theoretical 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.
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 2810 Deductive Logic (also PHIL 3310) (MQR)**
Spring. 4 credits.
For description, see PHIL 3310.

**MATH 2930 Differential Equations for Engineers (MQR)**
Fall, spring. 4 credits. Prerequisite: MATH 1910. 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. 4 credits. Prerequisite: MATH 2210 or 2940.
A more applied version of the course for engineers. Intended for students who want a brief one-semester introduction to the theory and techniques of both ordinary and partial differential equations. Topics for ordinary differential equations may include initial-value and two-point boundary value problems, the basic existence and uniqueness theorems, continuous dependence on data, stability of fixed-points, numerical methods, special functions. Topics for partial differential equations may include the Poisson, heat and wave equations, boundary and initial-boundary value problems, maximum principles, continuous dependence on data, separation of variables, Fourier series, Green's functions, numerical methods, transform methods.

**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.
Intended for students who want a brief one-semester introduction to the theory and techniques of both ordinary and partial differential equations. Topics for ordinary differential equations may include initial-value and two-point boundary value problems, the basic existence and uniqueness theorems, continuous dependence on data, stability of fixed-points, numerical methods, special functions. Topics for partial differential equations may include the Poisson, heat and wave equations, boundary and initial-boundary value problems, maximum principles, continuous dependence on data, separation of variables, Fourier series, Green's functions, numerical methods, transform methods.

**MATH 3320 Algebra and Number Theory (MQR)**
Fall. 4 credits. Prerequisite: MATH 2210, 2230, 2310, or 2940.
*See the list of courses with overlapping content at the end of the introduction.

*See the list of courses with overlapping content at the end of the introduction.
Covers various topics from number theory and modern algebra. Usually includes most of the following: primes and factorization, Diophantine equations, congruences, quadratic reciprocity, continued fractions, rings and fields, finite groups, and an introduction to the arithmetic of finite integers and quadratic fields. Motivation and examples for the concepts of abstract algebra are derived primarily from number theory and geometry.

**MATH 3360 Applicable Algebra (MQR)**
Spring. 4 credits. Prerequisite: MATH 2210, 2250, 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.

**MATH 3560 Groups and Geometry (MQR)**
Spring. 4 credits. Prerequisite: MATH 2210, 2250, 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 (BIOEE 1510, 1512, 1105–1106, 1107–1108, 1109–1110, or equivalent) and completion of math requirements for biological sciences major or equivalent. Next offered 2009–2010. 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. Participatory seminar aimed primarily at introducing senior and junior mathematics majors to some of the challenging problems and areas of modern mathematics. Helps students develop research and expository skills in mathematics, which is important for careers in any field that makes significant use of the mathematical sciences (i.e., pure or applied mathematics, physical or biological sciences, business and industry, medicine). Content varies from year to year.

**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 4060 Mathematics in Perspective (MQR)**
Spring. 4 credits. Prerequisite: permission of instructor. Examines several basic topics in mathematics, topics that are usually introduced in high school, from the perspective gained through a completed or nearly completed Cornell math major. Emphasizes the connections between branches of mathematics and the role of careful definitions and proofs in both deepening our understanding of mathematics and generating new mathematical ideas. In addition, the course relates these basic subjects to topics of current mathematical interest. Specific topics may include induction and recursion, synthetic and analytic geometry, number systems, the geometry of complex numbers, angle measurement and trigonometry, and the so-called elementary functions.

**MATH 4130 Honors Introduction to Analysis I (MQR)**
Fall, Spring. 4 credits. Prerequisites: high level of performance in MATH 2210–2220, 2250–2240, 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, 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 4200 Differential Equations and Dynamical Systems (MQR)**
Fall. 4 credits. Prerequisite: high level of performance in MATH 2210–2220, 2250–2240, 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, 2250–2240, 1920 and 2940, or permission of instructor. 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, 2250–2240, 1920 and 2940, or permission of instructor. 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. Fourier series use *natural* sinusoidal building blocks and may be used to help solve differential equations. Wavelets use *artificial* building blocks that have the advantage of localization in space. A full understanding of both topics requires a background involving Lebesgue integration theory and functional analysis. This course presents as much as possible on both topics without such formidable prerequisites. The emphasis is on clear statements of results and key ideas of proofs, working out examples, and applications. Related topics that may be included are Fourier transforms, Heisenberg uncertainty principle, Shannon sampling theorem, and Poisson summation formula.

**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: theoretical classes can be taken independently from each other and in either order.

Students interested in the applications of complex analysis should consider MATH 4220.
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 2200 and 2940, or permission of instructor.
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. 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. 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 4330 Honors Linear Algebra (MQR)
Fall. 4 credits. Prerequisite: high level of performance in MATH 2210, 2230, 2310, or 2940. 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 3320, 3360, 4310, or 4330, or permission of instructor.
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)

MATH 4500 Matrix Groups (MQR)
Fall. 4 credits. Prerequisite: MATH 2210–2220, 2230–2240, or 1920 and 2940. An introduction to a topic that is central to mathematics and important in physics and engineering. The objects of study are certain classes of matrices, such as orthogonal, unitary, or symplectic matrices. These classes have both algebraic structure (groups) and geometric/topological structure (manifolds). Thus the course will be a mixture of algebra and geometry/topology, with a little analysis as well. The topics will include Lie algebras (which are an extension of the notion of vector multiplication in three-dimensional space), 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). Concrete examples will be emphasized. Background not included in the prerequisites will be developed as needed.

MATH 4510 Euclidean and Spherical Geometry (MQR)
Fall. 4 credits. Prerequisite: MATH 2210, 2230, 2310, or 2940, or permission of instructor. Next offered 2009–2010. 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 2950–2940, plus at least one mathematics course numbered 3000 or above. MATH 4540 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. Prerequisites: 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. 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. Discusses both combinatorial properties (such as face counts) as well as geometric properties (such as rigidity). Covers theorems of Euler, Cauchy, and Steinitz; Voronoi diagrams and triangulations; convex hulls; cyclic polytopes; shellability; and the upper-bound theorem. Relates these ideas to applications in tiling, linear inequalities and linear programming; structural rigidity; computational geometry; hyperplane arrangements; and zonotopes.

MATH 4710 Basic Probability (MQR)*
Fall. 4 credits. Prerequisites: one year of calculus. Recommended: some knowledge of multivariate calculus. 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. 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
Spring. 4 credits. Prerequisites: MATH 4710, BI/TH/ES 4400, ORIE 3600, or ECON 3100. 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 queuing 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)
Fall. 4 credits. Prerequisites: MATH 2220 or 2230 and preferably some additional course involving proofs in mathematics, computer science, or philosophy. First course in mathematical logic providing precise definitions of the language of mathematics and the notion of proof (propositional and predicate logic). The completeness theorem says that we have all the rules of proof we could ever have. The Gödel incompleteness theorem says that they are not enough to decide all statements even about arithmetic or set theory. This course exploits the finiteness of proofs to show that theories have unintended (nonstandard) models. Possible additional topics: the mathematical definition of an algorithm and the existence of noncomputable functions; the basics of set theory to cardinality and the uncountability of the real numbers.

MATH 4860 Applied Logic (also CS 4860) (MQR)
Spring. 4 credits. Prerequisites: MATH 2210–2220, 2230–2240, or 1920 and 2940; CS 2800 or equivalent (e.g., MATH 3320, 3520, 3560, 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. Prerequisite: permission of instructor. Students interested in courses not listed here or in courses that are not listed in the catalog may register for such courses under this number after obtaining permission of the instructor. Supervised reading or research by arrangement with individual professors. Not for material currently available in regularly scheduled courses.

Professional-Level and Mathematics Education Courses

MATH 5050 Educational Issues in Undergraduate Mathematics
4 credits. Prerequisite: graduate standing or permission of instructor. Next offered 2009–2010.

MATH 5070 Teaching Secondary Mathematics: Theory and Practices
Spring. 4 credits. Provides direct experience of new approaches, curricula and standards in mathematics education. Discussion of articles, activities for the secondary classroom, and videotape of classroom teaching is tied to in-class exploration of math problems. Experience in the computer lab, examining software environments, and their use in the mathematics classroom is included. Participants are expected to write short papers, share ideas in class, and present their opinions on issues.

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 courses 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 website 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.

MATH 6150 Mathematical Methods in Physics
Fall. 4 credits. Prerequisite: for undergraduates, permission of instructor. Intended for graduate students in physics or related fields. Recommended: a strong advanced calculus course and at least two years of general physics. Assumes knowledge of elements of finite dimensional vector space theory, complex variables, separation of variables in partial differential equations, and Fourier series. Designed to give a working knowledge of the principal mathematical methods used in advanced physics. Covers Hilbert space, generalized functions, Fourier transform, Sturm-Liouville problem in ODE, Green’s functions, and asymptotic expansions.

MATH 6170 Dynamical Systems
Fall. 4 credits. Generally offered every two years. Next offered 2009–2010. Topics may include the Poincaré–Bendixon theorem, limit sets, structural stability, linearization at equilibrium points, the stable manifold theorem and the Kupka-Smale theorem.

MATH 6180 Smooth Ergodic Theory
Fall. 4 credits.

See the list of courses with overlapping content at the end of the introduction.
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


[MATH 6210] Measure Theory and Lebesgue Integration

Fall. 4 credits. Covers measure theory, integration, and Lp 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


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


[MATH 6340] Commutative Algebra


[MATH 6490] Lie Algebras

Spring. 4 credits. Topics include nilpotent, solvable and reductive Lie algebras; enveloping algebras; root systems; Coxeter groups; and classification of simple algebras.

[MATH 6500] Lie Groups

4 credits. Next offered 2009–2010. 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 smooth 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 developed. 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 2009–2010. 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 2009–2010. 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. Next offered 2009–2010. This introductory course covers basic materials of Riemannian geometry, starting from connections and curvatures, ending with a discussion of the relations between topology and geometry of positive (or negative) curvature.

[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 6170 (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-Löwenheim theorems. Other topics as time permits.

[MATH 7110–7120] Seminar in Analysis

7110, fall; 7120, spring. 4 credits. (Optional section may include nonparametric curve estimation and elements of large sample asymptotics.)

[MATH 7130] Functional Analysis


[MATH 7150] Fourier Analysis

Spring. 4 credits.

[MATH 7170] Applied Dynamical Systems (also TAM 7760)

Spring. 4 credits. Recommended: TAM 6750, MATH 6170, or equivalent. Next offered 2009–2010. Applied topics in dynamical systems theory: bifurcations, normal forms, complex invariant sets, numerical methods, multiple time scale systems, symmetric systems, biological and physical examples.

[MATH 7310–7320] Seminar in Algebra

7310, fall; 7320, spring. 4 credits each semester. 7320 next offered 2009–2010.

[MATH 7350] Topics in Algebra

Fall. 4 credits. Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.

[MATH 7370] Algebraic Number Theory

Spring. 4 credits.
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.

MATH 7510-7520 Berstein Seminar in Topology
7510, fall; 7520, spring. 4 credits each semester.

MATH 7530 Algebraic Topology II
Fall. 4 credits.
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
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). Next offered 2009–2010.
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
Fall. 4 credits.
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; 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. Next offered 2009–2010. 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.
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 devoted to the study of automatic structures, an emerging and exciting area of logic and theoretical computer science.

MATH 7900 Supervised Reading and Research
Fall, spring. 1–6 credits.

MEDIEVAL STUDIES


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. Coursework in medieval studies enhances the student's enjoyment and understanding of the artistic and material relics of the Middle Ages: Gregorian chant, 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,
GERST 4060 Introduction to Medieval German Literature II  
Spring. 4 credits. A. Groos.

HIST 2590 The Crusades  
Fall. 4 credits. P. Hyams.

HIST 2771 Getting Medieval II: The Age of Cathedral, Cartel, and Crossbow  
Fall. 4 credits. O. Fakk.

HIST 2830 English History from Anglo-Saxon Times to 1485  
Spring. 4 credits. P. Hyams.

HIST 3500 The Italian Renaissance (also ITAL 3500)  
Fall. 4 credits. J. Najemy.

HIST 4360 Conflict Resolution in Medieval Europe  
Spring. 4 credits. P. Hyams.

HIST 4601 Toward a Prehistory of Terrorism  
Fall. 4 credits. O. Fakk.

HIST 4850 Love and Sex in the Italian Renaissance (also ITAL 4850)  
Fall. 4 credits. J. Najemy.

LING 3315–3316 Old Norse  
3315, fall; 3316, spring. 4 credits each semester. L. Osp Heimisdóttir.

LING 4417 History of the Russian Language (also RUSSA 4401)  
Spring. 4 credits. W. Browne.

MEDVL 4103/6103 Survey of Medieval Latin Literature (also LATIN 4213/7213)  
Fall. 4 credits. C. Ruff.

This course assumes that participants need no further instruction in the basics of the Latin language and are ready to devote their energies to working on their sight-reading ability, improving their reading fluency and comfort level with a wide range of post-Classical literary idioms, and beginning to explore the research potential of Latin texts. Before enrolling in MEDVL 4103/6103, students should have placed at the 4000-level on the Classics Department's Latin placement exam and/or have had significant reading experience at the 2000- or 3000-level or the equivalent. A single academic year of grammar instruction is normally not sufficient preparation. Students in doubt about their readiness for this course should consult with the instructor.

The survey is designed to introduce students to characteristic genres and discourses of Medieval Latin. In fall 2008, the emphasis will be on historiography, biography, and hagiography, primarily from the 6th to the 12th centuries. A portion of the course will be set aside for students to work with the class on texts relevant to their own research interests. Research tools for Medieval Latin language and texts will be introduced in library sessions. The readings for this course will be mainly prose texts; the spring Topics in Medieval Latin course will deal with post-classical verse forms and poetic genres.

MEDVL 4201/6201 Topics in Medieval Latin Literature: Post-Classical Latin Verse and Versification (also LATIN 4223/7223)  
Spring. 4 credits. C. Ruff.

This course will consider three interrelated topics: the forms, content, and purposes of Latin verse in Christian Europe; how those verse forms were taught; and the relationship between changes in the Latin language and developments in versification. Verse readings will include hymnody and lyrics of late antiquity; the cento, acrostics; a range of accentual verse forms from early medieval Ireland to the 12th century; and examples of new embellishments to the hexameter. We will sample metrical treatises including the first handbooks of Latin versification written for non-native speakers and examples of the later medieval ari versificandi. Topics will include the relationship between verse and the liturgy; prosimetry and macaronic verse; didactic verse; changes in Latin and vernacular prosody and the reception of quantitative meters; and the revival of classical lyric meters at the end of the Middle Ages.

MEDVL 6102 Latin Paleography (also LATIN 7222)  
Spring. 4 credits. C. Ruff.

Latin Paleography will be devoted in approximately equal measure to the dating, localization, and reading of scripts, and to codicological methods in the study of medieval manuscripts. The primary emphasis will be on Latin bookhands from late antiquity to the high Middle Ages, but those with interests in earlier or later periods or vernacular texts will have a chance to work with materials in their areas of specialization. We will survey research tools in manuscript studies, including some of the major manuscript digitization projects; work with medieval materials in Kroch Library; and practice interpreting and critiquing paleographical and codicological arguments about the transmission of texts.

MEDVL 7770 Medieval Studies Seminar  
Fall. 2 credits. Staff.

This course is designed to introduce graduate students to some of the bibliography and approaches available for studying the Middle Ages. It is intended to alert students to various methodological and material sources, as well as some consideration of the history of these approaches. Discussion of graduate writing will be included, and some small projects may be assigned as relevant. Larger projects in relation to these topics or methods may be pursued as independent studies in relation to the seminar.

MEDVL 8010 Directed Study—Individual  
Fall and spring. 1–4 credits. Staff.

MEDVL 8020 Directed Study—Group  
Fall and spring. 1–4 credits. Staff.

MUSIC 7201 Topic in Medieval Music: The Music of the Troubadours and Trouvères  
Fall. 4 credits. J. Peraino.

NES 2212 Quran and Commentary (also RELST 2212)  
Spring. 3 credits. D. Powers.

NES 2655 Introduction to Islamic Civilization (also HIST 2530, RELST 2530)  
Fall. 3 credits. D. Powers.

NES 2754 Introduction to Near Eastern Civilizations: Literature of the Near East  
Fall. 3 credits. S. Toorawa.
MUSIC
Office: 255–4978
Web site: www.arts.cornell.edu/music

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
Sage Chapel Choir
World Music Choir

Instrumental ensembles
Chamber Music Ensembles
Chamber Orchestra
Symphony Orchestra
Jazz Ensembles
Jazz Combos
Chamber Winds
Wind Ensemble
Wind Symphony
Gamelan
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-organized 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.arts.cornell.edu/music. 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 (255–4978).

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 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(102) for 3 credits, 1105(105) for 3 credits, or 2101/2103 (151/153) 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 courses 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 1101/1103 and 2104(154), 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(401)–4912(402) 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 department office, 101 Lincoln Hall (255-4097).

## 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, eight have grand pianos, six have upright pianos, and two have percussion instruments.

For information about access to the practice rooms, see www.arts.cornell.edu/music/practicerooms.html 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 serve 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 experimental music performance, and multichannel recording. The center operates its own web server with space for web hosting, data backup, and remote login. CEMCs 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(100) 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, requires basic pitch, rhythm, and score-reading skills needed for some introductory courses and 2000-level courses with prerequisites.

#### MUSIC 1101(102) 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, dynamic 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. Extend listening and video examples.

#### MUSIC 1105(105) 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 art music, emphasizing fundamental musical techniques, theoretical concepts, and their application. Intervals, scales, triads; basic concepts of tonality and form; analysis of representative works.

#### MUSIC 2101(151) 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; 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(152) Tonal Theory II (LA-AS)

Spring. 3 credits. Prerequisites: MUSIC 2101 and 2104 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(153) Musicianship I

Fall. 2 credits. Pre- or corequisite: MUSIC 2101. Intended for students expecting to major in music and other qualified students. Staff.

#### MUSIC 2104(154) Musicianship II

Spring. 2 credits. Pre- or corequisite: MUSIC 2102. Intended for students expecting to major in music and other qualified students. Staff.
Sight singing: longer melodies in three clefs, including diatonic modulation. Keyboard: diatonic chord progressions and sequences. Dictation: intervals, rhythms; longer melodies; complete phrases with or without modulation. Score reading: three parts using treble, alto, and bass clefs. Transcriptions of pop, jazz, and other genres.

#### MUSIC 2111(204) Physics of Musical Sound (also PHYS 1204) (PBS)

Spring. 3 credits. K. Selby.
For description, see PHYS 1204.

#### MUSIC 2112(112) Popular Song Writing

Spring. 2 credits. Prerequisite: MUSIC 1105 or permission of instructor. M. Brown.
Students will compose pop and rock songs by imitating the methods of songwriters from the 20th and 21st centuries. Discussions will explore trends in musical form, poetic content, social impact, and criticism. Class members will participate by performing their own songs
MUSIC 3101(251) 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(252) 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(253) Musicianship III
Fall. 2 credits. Pre- or corequisite: MUSIC 3102. Staff.

MUSIC 3104(254) 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(361) Jazz Improvisation I
Fall. 2 credits. Prerequisite: MUSIC 2101 or permission of instructor. Next offered 2009–2010. P. Merrill.
An introduction to fundamental jazz theory, technique, and applied skills.

MUSIC 3112(362) Jazz Improvisation II
Fall. 2 credits. Prerequisite: MUSIC 3111. M. Brown.
Continuation of jazz theory, technique, and applied skills. Class work and assignments emphasize altered upper-structures and Dominants, chords and modes of melodic minor, harmonic minor, substitutions, and advanced rhythmic development. Performance, composition, analysis, transcribing, listening, and ear training.

[MUSIC 3113(363) Jazz Improvisation III
Class work and assignments emphasize Coltrane and post-Coltrane harmony, advanced rhythmic development, augmented vocabulary, and an introduction to playing “free.”

[MUSIC 3115(365) Jazz Piano
Spring. 2 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(451) Counterpoint # (LA-AS)
Spring. 4 credits. Prerequisite: MUSIC 2101 or permission of instructor. Next offered 2010–2011. S. Stucky.

[MUSIC 4102(452) Topics in Music Analysis (also MUSIC 6110) (LA-AS)
Spring. 4 credits. Prerequisite: MUSIC 2101 or permission of instructor. Next offered 2009–2010. J. Webster.

[MUSIC 4103(457) Topics in Post-Tonal Theory and Analysis (also MUSIC 7102) (LA-AS)

MUSIC 4111(453) Composition (LA-AS)
Spring. 4 credits. Prerequisite: MUSIC 3101 or permission of instructor. 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, with permission and if taught by a different instructor.

[MUSIC 4121(455) Conducting (LA-AS)
Fall. 4 credits. Prerequisite: MUSIC 3101 or equivalent. Next offered 2009–2010. C. Kim.
Covers fundamentals of score reading, score analysis, rehearsal procedures, and conducting technique; instrumental and chorale models.

[MUSIC 4122(456) 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(458) Jazz Arranging (LA-AS)
Fall. 4 credits. Prerequisite: MUSIC 3111 or permission of instructor. Next offered 2009–2010. P. Merrill.
A survey of jazz arranging techniques for the big band.

Music in History and Culture

MUSIC 1201(107) Hildegard to Handel # (LA-AS)
Fall. 3 credits. Prerequisite: ability to read music or concurrent enrollment in MUSIC 1100. R. Harris-Warrick.
The main trends in Western music from the beginnings of musical 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, the Ars nova, Renaissance polyphony, the invention of the opera, and the rise of instrumental music.

MUSIC 1202(108) Monteverdi to Minimalism # (LA-AS)
Spring. 3 credits. Prerequisite: ability to read music or concurrent enrollment in MUSIC 1100 or successful completion of another college-level music course. N. Zaslav.
A synoptic romp through the history of Western art music from the late Renaissance to the day before yesterday. Works emphasized: Monteverdi’s Orfeo (1607), Handel’s Messiah (1742), Mozart’s Don Giovanni (1787), Beethoven’s Ninth Symphony (1824), Berlioz’s Symphonie fantastique (1830), Wagner’s Das Rheingold (1876), Stravinsky’s Rite of Spring (1913), Bartok’s Concerto for Orchestra (1943), the sinfonias of Roberto Sierra, and new works commissioned by and for the class.

MUSIC 1300(103) Introduction to World Music I: Africa and the Americas (also ASIAN 1301) (CA-AS)
Spring. 3 credits. No previous training in music required. 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 1300(104) Introduction to World Music II: Asia (also ASIAN 1192) (CA-AS)
An exploration of folk, popular, and traditional musical genres from South, Southeast, and East Asia.

[MUSIC 1311(101) Popular Music in America: A Historical Survey (also AMST 1311) (LA-AS)
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(221) 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(222) 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(245) Gamelan in Indonesian History and Cultures (also ASIAN 2245, VISST 2774) (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 Indonesian music through its art, a survey of the elementary techniques of performance on the Indonesian gamelan; one of the world’s most ancient music traditions, 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(261) Bach and Handel # (LA-AS)]
Spring. 3 credits. Prerequisite: any 3-credit music course or permission of instructor. Next offered 2010–2011. D. Yarnsley. The course will look in depth at selected masterpieces of each composer, investigating these works’ significance in the 18th century and in our own time.

[MUSIC 2222(262) Haydn and Mozart # (LA-AS)]
Fall. 3 credits. Prerequisite: any 3-credit music course or permission of instructor. Next offered 2009–2010. J. Webster. A survey of the lives, works, and historical roles of Joseph Haydn and Wolfgang Amadeus Mozart.

[MUSIC 2223(263) Beethoven # (LA-AS)]
Fall. 3 credits. Prerequisite: any 3-credit music course or permission of instructor. 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 (also HIST 2224)]
Spring. 3 credits. Prerequisite: ability to read music or concurrent enrollment in MUSIC 1100 or successful completion of another college-level music course. N. Zaslav. An exploration of the phenomenon that is Wolfgang Amadeus Mozart, using historical documents to contextualize his life and works while using an extensive documentation of his life and works to learn about history.

[MUSIC 2231(264) Musical Romantics # (LA-AS)]
Spring. 3 credits. Prerequisite: ability to read music or concurrent enrollment in MUSIC 1100. Next offered 2010–2011. Staff.

[MUSIC 2241(274) Opera (also THETR 2730) # (LA-AS)]
Fall. 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—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(276) 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. Zaslav. The music of, and the social structures supporting, large instrumental ensembles in the Western world from the 16th century to the present.

[MUSIC 2243(272) Words and Music (also GERST 3600) # (LA-AS)]
Spring. 4 credits. Next offered 2009–2010. A. Groos. For description, see GERST 3600.

[MUSIC 2301(270) Discovering Hip-Hop: Research and the Cornell Hip-Hop Collection # (LA-AS)]
Spring. 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 4511(407) Early Dance (also DANCE 4399)]
Fall. 1 credit. R. L. and R. M. Harris-Warrick. Topic: Baroque Dance. This course introduces students to the basic movement vocabulary of dances from Western Europe during the Baroque period. It will consider the contexts in which such dances were performed, the music that accompanied the dance, and issues of how to reconstruct dances from the past. It is primarily a movement course, but will involve some reading from primary sources. The course may be repeated for credit.

[MUSIC 4512(408) Music and Choreography (also DANCE 3530) (LA-AS)]
Spring. 3 credits. Attendance at dance concerts and music concerts required. A. Fogelsanger. For description, see DANCE 3530.

[MUSIC 2244(411) The Organ in Western Culture # (LA-AS)]
Fall. 4 credits. Prerequisite: permission of instructor. Next offered 2009–2010. A. Richards and D. Yarnsley.

[MUSIC 3201(207) 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(208) 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(300) Proseminar in Musicology (LA-AS)]
Spring. 4 credits. Prerequisite: MUSIC 3201–3202. D. Yarnsley. Introduction to methods in musicology, including historiography, criticism, approaches to vernacular and non-western musics, and gender studies.

[MUSIC 3222(374) Opera and Culture (also GERST/THETR 3740) # (LA-AS)]
Spring. 4 credits. Prerequisite: any 3-credit music course or proficiency in German or Italian. A. Groos. For description, see GERST 3740.

[MUSIC 3231(381) Topics in Western Art Music to 1750 # (LA-AS)]
Fall. 4 credits. Prerequisite: MUSIC 2102 or permission of instructor. Next offered 2010–2011. Staff.

[MUSIC 3232(382) Topics in Western Art Music 1750–Present # (LA-AS)]
Spring. 4 credits. Prerequisite: MUSIC 2102 or permission of instructor. Next offered 2009–2010. Staff.

[MUSIC 3242(390) Culture of the Renaissance II (also ARTH 3420, COML/FREN/RELST 3630, HIST 3640) # (CA-AS)]

[MUSIC 3241(308) Topics in Popular Music and Jazz # (LA-AS)]
Fall. 4 credits. Prerequisite: MUSIC 2102/2104 or permission of instructor. S. Pond. This course addresses various topics, centering on 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(398–399) Supplemental Study in Music History # (CA-AS)]
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 participate in, but do not register for, an approved 200-level music history course and, in addition, pursue independent research and writing projects. See also “Independent Study and Honors.”

**MUSIC 4181(418) 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(400) Senior Seminar**
Fall. 4 credits. Prerequisite: MUSIC 3211.
N. Zaslav.
Investigations of Mozart as man, musician, myth, icon, and commodity.

**MUSIC 4222(410) Music and Monstrous Imaginings # (LA-AS)**
Spring. 4 credits. Prerequisite: ability to follow a musical score. A. Richards.
Exploring intersections between musical, literary, and visual culture at the margins of the rational in the 18th and early 19th centuries. How do the monstrous, mad, and fantastical figure in cultural theory and practice of the period? What are the implications of theories of genius and imagination for the conception of ‘eccentric’ works of art, especially musical ones?

In conjunction with literature and visual art of the period we will examine individual musical texts, identifying notions of musical fantasia and phantasmagoria, as well as delineating the musical imaginary within and as cultural practice. A prior knowledge of music theory, while not essential, will be useful for this course.

**[MUSIC 4231(492) Music and Queer Identity (CA-AS)]**
J. Peraino.

**[MUSIC 4232(493) Women and Music (CA-AS)]**
J. Peraino.

**MUSIC 4301(404) Introduction to Ethnomusicology (also MUSIC 6301) (SBA-AS)**
Spring. 4 credits. M. Hatch.
For description, see MUSIC 6301.

**Electroacoustic Music Courses**

**MUSIC 1421(120) Introduction to Computer Music (LA-AS)**
Fall. 3 credits. Limited enrollment.
Prerequisite: permission of instructor.
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(165) Computing in the Arts (also CS/CIS/ENGR 1610, FILM 1750, PSYC 1650)**
Fall. 3 credits. G. Bailey.
For description, see CS 1610.

**[MUSIC 2421(220) Computers in Music Performance (LA-AS)]**
Spring. 3 credits. Limited enrollment.
A course in live performance (and real-time, interactive sound manipulation techniques).

**MUSIC 3421(320) Scoring the Moving Image (LA-AS)**
Spring. 4 credits. Limited enrollment.
Prerequisite: permission of instructor. K. Ernste.
A composition-based introduction to computer 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(355) Sound Design and Digital Audio (also DANCE/THETR 3680) (LA-AS)**
Spring. 3 credits. W. Cross.
For description, see THETR 3680.

**MUSIC 3441(356) Interactive Performance Technology (also DANCE/THETR 3690) (LA-AS)**
Fall. 4 credits. W. Cross and A. Vogelsanger.
For description, see THETR 3690.

**Independent Study and Honors**

**MUSIC 4901(301–302) Independent Study in Music**
Fall or spring. 1–4 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(401-402) 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. Other instruments may sometimes be studied for credit outside Cornell, but also by audition only (see MUSIC 3501–4501, Secs 8, 9, and 10).

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 4601–4621). 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. Any member of department-sponsored ensembles may, with the permission of the director of the ensemble, receive a partial scholarship to help defray the cost of the lessons. All scholarships are intended only for lessons in the student’s primary performing medium. Scholarship 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(321, 322, and 323)**

** 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 juniors and seniors 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.
MUSIC 3604(443–444) 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(445–446) 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(348) World Music Choir
Spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester. Prerequisite: permission of instructor. 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(425–426) 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 2008–09 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(433–434) 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, horns (brake drums), and other percussion instruments.

MUSIC 3614(431–432) Middle Eastern Music Ensemble (also NES 3914/4948)
Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester. Prerequisite: permission of instructor. M. Hatch. Performance of diverse musical traditions from the Middle East. Instruction in individual instruments (oud, nay, 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(339–340) Jazz Ensemble II
Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester. Prerequisite: successful audition. M. Brown. Study and performance of classic and contemporary big band literature. Rehearsal once a week with one to two performances a semester.

MUSIC 3616(423–424) Jazz Combos
Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester. Prerequisite: successful audition. M. Brown. Study and performance of classic and contemporary small-group jazz.

MUSIC 3621(343–344) 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(338) Wind Symphony
Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester. Prerequisite: successful audition. M. Marsit.

MUSIC 3632(342) 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. Co-requisite: 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(447–448) 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(439–440) Jazz Ensemble I
Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester. Prerequisite: successful audition. M. Brown. Study and performance of classic and contemporary big band literature. Rehearsals twice a week with two to four performances per semester.

MUSIC 4616(423–424) Jazz Combos
Fall and spring. Either 0 credits, S–U, or 1 credit, letter grade, each semester. Prerequisite: successful audition. M. Brown. Study and performance of classic and contemporary small-group jazz.

MUSIC 4621(421–422) 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(437–438) 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 641(345–346) 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. Fall and spring. C. Miller. Concentrated instruction for students in advanced techniques of performance on Indonesian gamelan instruments.

MUSIC 4651(441–442) 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 610(602) Analytical Technique (also MUSIC 4102)]

MUSIC 6201(601) 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(604) 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 repertories 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(620) Techniques for Computer Music
Fall. 4 credits. Prerequisite: permission of instructor. K. Emste.
Intended principally for doctoral students in music composition but open to others by permission. The course presents a practical overview of both classical and state-of-the-art techniques for computer music including digital synthesis, signal processing and sound manipulation, analysis and resynthesis, spatialization, and real-time and/or interactive applications. Students will produce several short studio projects as well as one larger piece to be presented in a final concert.

MUSIC 6421(659) Electroacoustic Composition
Spring. 4 credits. Prerequisite: permission of instructor. K. Emste.
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 composition, an emphasis on aesthetic issues associated with the field, interactivity and real-time performance, software instrument design, performance controllers, or other topics.

MUSIC 7101(653) Topics in Tonal Theory and Analysis
Spring. 4 credits. J. Webster.
Topic: Sonata—form theory.

[MUSIC 7102(654) Topics in Post-Tonal Theory and Analysis (also MUSIC 4103)]

[MUSIC 7103(785) History of Music Theory]
Fall. 4 credits. Next offered 2009–2010. Staff.
Issues and problems in the history of music theory; topics vary from year to year.

MUSIC 7111(657–658) Composition
Fall and spring. 4 credits each semester. R. Sierra and S. Stucky.

MUSIC 7121(656) Advanced Orchestral Technique
Fall. 4 credits. S. Stucky.
Intensive analysis of orchestral scores by such composers as Debussy, Ravel, Stravinsky, Dutilleux, Boulez, Lutoslawski, Berio, Takemitsu, Dusokman, Knussen, Benjamin, Adams, Saariaho, and Lindberg, with an emphasis on modern instrumental techniques, gestures, and textures. Composition exercises aimed at harnessing these discoveries for the students’ own work. Designed for doctoral candidates in composition; others admitted by permission only.

MUSIC 7201(681) Seminar in Medieval Music
Fall. 4 credits. J. Peraino.
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 analysis. Other topics will include how to interpret “love” as constructed in the lyrics, the relationship of trouvére song to polyphonic motets, and modern recordings and performance practice issues.

[MUSIC 7202(684) Seminar in Renaissance Music]

MUSIC 7203(686) Seminar in Baroque Music
Spring. 4 credits. D. Yearsley.
Topic: The Organ Music of J. S. Bach. The seminar investigates interrelated issues (source-critical, aesthetic, organological, cultural) surrounding this seminal body of keyboard works.

MUSIC 7204(688) Seminar in Classical Music
Fall. 4 credits. N. Zaslaw.
Topic: The concept of the Kleineimster and its effects upon the writing of music history, its role in maintaining the notions “canon” and “canonicity,” and its influence upon performers, performing-arts organizations, audiences, educators, music publishers, and recording companies. The seminar will progress from the theoretical (historiography) through the scholarly (articles, books, editions) to the applied (performances, recordings).

[MUSIC 7205(689) Seminar in Music of the Romantic Era]

[MUSIC 7206(690) Seminar in Music of the 20th Century]

[MUSIC 7211(693) Seminar in Performance Practice]

[MUSIC 7221(677) Mozart: His Life, Works, and Times]

[MUSIC 7231(683) Music and Postmodern Critical Theory]

MUSIC 7232(787) History and Criticism

[MUSIC 7301(680) 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 2009–2010. S. Pond.

MUSIC 7501(691–692) Historical Performance
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

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/nesh.
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 requirements (no course 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:
   a. NES 2651 Judaism, Christianity, and Islam or NES 2754 Introduction to Near Eastern Civilizations
   b. NES 4560 Junior/Senior Proseminar: Theory and Method in Near Eastern Studies
   c. 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 2601 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
         - NES 4560 Junior/Senior Proseminar
         - NES 6000 to 1800 CE
         - 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
         - NES 4619 Seminar in Islamic History (CA)
         - NES 5651 History of the Middle East: 19th to 20th Centuries
         - NES 6053 Middle Eastern Cities
         - NES 6093 History of Jews and Christians in the Modern Middle East
         - NES 6097 History of the Israeli-Palestinian Conflict
         - NES 4703 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):
         - NES 3594 Gender, Sexuality, and the Body in Early Christianity
         - NES 3658 Middle Eastern Cities: History, Society, and Culture
         - NES 4657 Formation of Islamic Law
         - NES 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. The precise requirements (no course option not permitted):

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 3.5 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 section. 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 section. 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 210 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 2201 Elementary Arabic for Native Speakers  
Spring. 4 credits. Satisfies Option 1. Prerequisite: fluency in a spoken Arabic dialect. M. Younes.

This course is designed for students who can speak and understand a spoken Arabic dialect (Egyptian, Lebanese, Syrian, Iraqi, etc.) but have little or no knowledge of written Arabic, known as Classical Arabic, Modern Standard Arabic, or Fusha. The focus of the course will be on developing the reading and writing skills through the use of graded, but challenging and interesting materials. As they develop their reading and writing skills, students will be learning about Arab history, society, and culture. Classroom activities will be conducted totally in Arabic. Students will not be expected or pressured to speak in Classical Arabic, but will use their own dialects for speaking purposes. However, one of the main goals of the course will be to help the development of the skills to communicate and understand Educated Spoken Arabic, a form of Arabic that is based on the spoken dialects but uses the educated vocabulary and structures of Fusha.

NES 2204 Introduction to Quranic Arabic (also ASRC 2106, RELST 2204) (LA-AS)  
Spring. 4 credits. Prerequisite: Knowledge of the Arabic alphabet. M. Younes.

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 suaras of varying length (36, 19, and 12). We will start with the shortest suaras 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 suara, 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 1500-2000 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 2301–3202 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 4203 Readings in Arabic Poetry (LA-AS)  
Fall. 4 credits. Prerequisite: NES 3202, a 4000-level Arabic course, or permission of instructor. Next offered 2009–2010. S. M. Toorawa.

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 2009–2010. S. M. Toorawa.

Aramaic

NES 4440 Aramaic  
Spring. 4 credits. Prerequisite: knowledge of Hebrew. L. Jovanovic.

For at least a millennium, from the sixth century BCE to the Arab conquest, Aramaic was the international language of diplomacy and commerce in the Near East. In this introductory course we will read the Aramaic portions of the Hebrew Bible, and a selection of material drawn from old Aramaic inscriptions, the Dead Sea Scrolls, the letters from Elephantine, and the Targums. The analysis of vocabulary, grammar, and syntax will presuppose the student’s familiarity with biblical Hebrew.

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 section. Prerequisite: for NES 1101, NES 1101 with grade of C– or better or permission of instructor. Letter grades recommended. 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 section. 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 2100 Intermediate Modern 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.

Introduces Hebrew literature and Israeli culture through the use of texts and audiovisual materials.

NES 2301–3102 Advanced Intermediate Modern Hebrew I and II (also JWST 3101–3102)  
3101, fall; 3102, spring. 4 credits. Satisfies Option 1. Prerequisite: NES 2200 or permission of instructor. NES 3201 with grade of C– or above or permission of instructor; for 3102, NES/JWST 3101.

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 3103 Love, Wine, Death, and In Between (also JWST 3103)  
Fall. 4 credits. Prerequisite: NES 3102, or permission of instructor. Letter grade recommended. 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 enjoyment. 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 Conversational Hebrew (also JWST 3105)  
Spring. 2 credits. Limited to 15 students. Prerequisite: NES 3102, 4100, or permission of instructor; non-native speakers only. Letter grades recommended. Next offered 2009–2010. N. Scharf.

NES 4101 Modern Hebrew Literature (also JWST 4101) (LA-AS)  

NES 4102 Biblical Hebrew Prose—Judges (also JWST/RELST 4102) (LA-AS)  
NES 4104 Hebrew Literature (also JWST 4104)
Spring. 4 credits. D. Abusch.
The course follows the path of Modern Hebrew fiction, starting with the products of multilingual immigrants based in European and Jewish culture, through texts in a revived spoken language written by citizens of a new country, to an expansion in the current generation from an exclusively high literary culture to one which encompasses detective novels and comics. Formal qualities of canonical texts, their social and biographical context, and the evolution of language and an intense literary culture are thematized. Accessible both to those with some knowledge of Hebrew, and those without any, with texts available in translation as well as the original, and discussion conducted in English. Authors may include Agnon, Baron, Oz, Yehoshua, Y. Shabtai, Hoffman, Guir, Keret.

Hindi–Urdu

NES 2201–2202 Intermediate Written Urdu (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 each semester. 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. O. Balkman. 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 each semester. Prerequisite: one year (two semesters) elementary Turkish or permission of instructor. O. Balkman. A continuation of NES 1330–1331. Continued development of speaking, listening, reading, and writing skills.

Ancient Near Eastern Languages

Akkadian

NES 3410–3411 Elementary Akkadian I and II (also NES 6410–6411)
3410, fall; 3411, spring. @ (LA-AS). 4 credits each semester. Prerequisite: for NES 3411, NES 3410 or permission of instructor. Recommended: knowledge of another Semitic language: A. Gadotti and L. Alfreed. Introduction to the Semitic language of the Akkadians and Babylonians of ancient Mesopotamia. Using the inductive method, students are rapidly introduced to the grammar and the cuneiform writing system of Akkadian through selected readings in the Code of Hammurabi, the Descent of Ishtar, and the Annals of Sennacherib. Elementary and intermediate readings in comparative Semitic linguistics, the position of Akkadian in the family of Semitic languages and on the history and culture of Mesopotamia provide a background for study of the language.

Topics Courses

[NES 1111 Introduction to Biblical Hebrew I (also JWST/RELST 1111)]
Fall. 3 credits. Next offered 2009–2010. L. Monroe.

NES 2212 Quran and Commentary (also RELST 2212) @ (LA-AS)
Spring. 3 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 2255 Islam in America (also AMST/RELST 2255) @ (LA-AS)
Summer. 3 credits. S. M. Toorawa.
In this class we will focus on Muslims living in America. We begin with Muslim African slaves and the trace the development of American forms of Islam and their relationship to American culture, politics, and religion, particularly in the 20th century. We then look at Muslim Americans who are more recent immigrants and the problems they have adapting and/or assimilating to American culture. We will examine the ways in which American Muslim thinkers are formulating and reformulating Islam, and we will analyze the portrayal of Muslims and Islam in the American media.

NES 2655 Introduction to Islamic Civilization (also HIST 2530, RELST 2655) @ (CA-AS)
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 Ships and Seafaring—Introduction to Nautical Archaeology (also ARKEO/JWST/RELST 2661, LA 2520) @ (CA-AS)
Fall. 3 credits. J. Zorn.
The course will survey the common and not-so-common daily activities of the world of ancient Israel and its neighbors in Mesopotamia, Egypt, and Canaan. Many courses cover aspects of ancient political history or ancient literature, but these often focus on the activities of members of social elites, at the expense of the activities of more average citizens. The focus of this class is on ancient technologies and human interactions with the environment. It will provide a broad spectrum, spanning all social classes, and many different kinds of resources and activities. Material to be covered will include topics such as food production and processing, pottery production, metallurgy, glass making, cloth production and personal adornment, implements of war, medicine, leisure time (games and music), and others.

NES 2663 Introduction to Biblical History and Archaeology (also ARKEO/JWST/RELST 2663) @ (CA-AS)
Fall. 3 credits. Next offered 2009–2010. J. Zorn.]
NEL 2668 Ancient Egyptian Civilization
(also ARKEO/JWST 2668, HIST 2880)
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.

NEL 2670 History of Modern Egypt (also HIST 2672)
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 era. We will accomplish this with the aid of a variety of texts and media, including novels and films.

NEL 2672 Imperialism and the History of the Modern Middle East (also JWST 2672)

NEL 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 development 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 contextualized with translated primary sources, which will form the backbone of class discussions.

NEL 2675 The Religions of Ancient Israel (also ARKEO/JWST/RELS/ 2675) [HA-AS]

NEL 2724 Introduction to Hebrew Bible—Prophecy (also JWST/RELS 2724) (LA-AS)
Fall. 3 credits. L. Jovanovic.
Though many recognize the centrality of the Tanakh/Old Testament/Hebrew Bible in Christianity, Judaism, and Islam, and its impact on world civilization, Voltaire’s observation, made some three centuries ago, that the Bible is “more celebrated than known” has lost none of its validity. This course is an enterprise in bridging this gap through the careful reading of the biblical literature and the use of academic tools so that students develop the skills for reading and interpreting biblical texts in the light of modern approaches. The writings will be contextualized from their ancient Near Eastern setting to their later appropriation by Judaism, Christianity, and Islam. Finally, through writing and projects, students will have the opportunity to examine current interpretations of the Hebrew Bible in art, music, literature, film, sport, politics, popular culture, academic discussions, or public controversies, and reflect on how these ancient texts still influence us in the digital age. Because of the shortage of time to entertain topics of limitless potential we will need to be highly selective.

NEL 2754 Introduction to Near Eastern Civilization
Fall. 3 credits. S. M. Toorawa.
This course 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. Topics will vary from year to year. In 2006–07, the course will focus on the literatures of Early Egypt and will be organized around the theme ‘Heroism and Villainy’. Readings will include selections from The Epic of Gilgamesh, Genesis, the Shahnameh, the Arabian Nights, and more.

NEL 2759 Middle Eastern Cinema (also COM/LIL/SCS 2930, JWST 2793, VISST 2193) (LA-AS)

NEL 3524/6524 Israelite Prophecy (also JWST/RELST 3524)
Spring. 4 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 Israeliite 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.

NEL 3551 Law, Society, and Culture in the Middle East (also HIST 3651/6651, NES 6551, RELST 3651) @ (CA-AS)
Spring. 4 credits. No prerequisites. D. Powers.
In this seminar, we will explore the nature of the Islamic judicial system and notions of justice. Class discussions will be based upon the close reading of historical materials, including legal documents, judicial opinions, and court cases (all in English translation), which will form the basis of writing assignments. Themes to be treated will include the marital regime, relations between parents and children, gender, slavery, the intergenerational transmission of property, the status of non-Muslims, crime and its punishment, law and the public sphere. Final research paper required.

NEL 3619 Near Eastern Christianities, 50–560 CE (also HIST/JWST/RELST 3619) @ (HA-AS)
Fall. 4 credits. K. Haines-Eitzen.
This course treats the history of Christianity from 50–560 C.E. (i.e., from Paul to the emergence of Islam), with a particular focus on the varieties of Christianity that emerged in the Eastern Mediterranean. We will explore major developments in the Middle East and North Africa regions during this time period. After surveying what we can learn about the spread of Christian practices and beliefs in the earliest centuries, we will turn to exploring various ‘heresies’ (e.g., Montanism, Gnosticism, Marcionism, Nestorianism) and look closely at how and why the culture and society of different regions (e.g., Asia Minor/Turkey; Armenia, Syria, Mesopotamia/Iraq, Persia/Iran, Palestine, Egypt, Ethiopia) contributed to diverse manifestations of Christianity. Along the way, we will also consider gender and asceticism, the production and dissemination of Christian literature, and the interactions of Christianity and Judaism, as well as Christianity and Islam.

NEL 3658 History of Iran (also HIST 3658)
Spring. 4 credits. I. Gocheleshvili.
The course examines the most significant and defining phases of Iran’s historic development concentrating on events and individuals that shaped its past and present. Drawing from various sources we will view the events from variety of perspectives and, among other questions, will also touch on much debated issues such as the meaning of “real Iranian” identity, relation of pre-Islamic Iranian practices and Islamic traditions in shaping of Iranian nation-state. The course will explore major developments in Iran’s history from the time of the first empires to modern republic.

NEL 3661 Sumerian Language and Culture I (also ARKEO/JWST 3661/6661, NES 6661) @ (HA-AS)
Fall. 4 credits. D. I. Owen.
This course focuses on a intense introduction to Sumerian language and grammar with additional readings in literature in translation. Particular emphasis is placed on the reading and interpretation of original texts from the Cornell collection and their use in the reconstruction of Mesopotamian history and culture in the third millennium BCE.

NEL 3665 Ancient Iraq I: 2000–331 BCE (also ARKEO/JWST 3665) (HA-AS)
Fall. 4 credits. D. I. Owen.
An introductory survey of the history and archaeology of the major civilizations of the Near East from the Persian Gulf to Mesopotamia—into 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, Elamite, Elamite, Canaanite, Assyrian, Syro-Phoenician, and Israeliite cultures will be discussed with particular emphasis on indigenous developments and cross-cultural contacts. Extensive use of visual aids will highlight the course.

NEL 3657 Origins of Writing (also LING 3667) @ (HA-AS)
Spring. 4 credits. A. Gadotti.
This class examines writing—its definition, its function, and its origins. The class will focus primarily on the development of cuneiform in the ancient Near East, but manifestations of writing from Egypt, China, Mesoamerica, and elsewhere will also be considered.

NEL 3658 Israeli-Palestinian Conflict (also GOVT/JWST 3697, HIST/SCOT 3970) @ (HA-AS)
Fall. 4 credits. I. 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, and the reciprocal war reperussions 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) ®
S. M. Toorawa.]

[NES 3709 Modern Arabic Drama @
(LA-AS) ®
S. M. Toorawa.]

[NES 3716 Education of Princes: Medieval
Advice Literature of Rulership and
Counsel (also COML/GOVT 3716) ® #
(HA-AS, LA-AS)
Fall. 4 credits. S. M. Toorawa.
In this course we will read works in the
"mirrors for princes" genre, a type of political
writing that flourished in the Muslim World and
Europe in the Middle Ages and Renaissance;
intended as a guide for rulers. By reading such
works we will learn about the ethical and
moral considerations that guided (or were
meant to guide) rulers in the formulation of polices,
and about theories of rule and rulership. We
will be reading from several cultural,
religious, and political traditions.
Authors include Aquinas, Castiglione, Christine
of Pisan, Dante, al-Ghazzali, Ibn al-Muqaffa,
John of Salisbury, Machiavelli, Muhammad
Baqr, Qabus, Nizam al-Mulk, and Tahir ibn
Abdallah. All texts are in English translation.

[NES 3720 Women in Ancient Israel
(also JWST/RELST 3270) ® (LA-AS)
L. Monroe.]

[NES 3759 Romanesque and Early Gothic
Art and Architecture: Europe and the
Medieval East, 900–1150 A.D. (also
ARTH 3300) ® (LA-AS)
Spring. 4 credits. C. Robinson.
For description, see ARTH 3300.

[NES 3844 Islamic Politics (also GOVT
3344)
Fall. 4 credits. D. Patel.
For description, see GOVT 3344.

[NES 3850 Middle Eastern Politics (also
GOVT 5353) ® (CA-AS)
Spring. 4 credits. D. Patel.
For description, see GOVT 5353.

[NES 3914 Middle Eastern Music
Ensemble (also MUSIC 3614)
Fall and spring. 1 credit each semester.
Limited to 40 students. Prerequisite: permission of instructor. M. Hatch and staff.
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 2009–2010.]

[NES 4211 Readings in Arabic Literature
(LA-AS)
S. M. Toorawa.]

[NES 4501 Islam in Africa and Its
Diapora (also ASRC 4201) ® (CA-AS)
Spring. 4 credits. A. Mazrui.
For description, see ASRC 4201.

[NES 4511 The Multicultural Alhambra
(also ARTH 4311, VISET 4621)
Spring. 4 credits. C. Robinson.
For description, see ARTH 4311.

[NES 4540 Maimonides and Averroes
(JWST/RELST 4540, SPAN 4380) ®
(CA-AS)
Spring. 4 credits. Next offered 2009–2010.]

[NES 4560 Theory and Method in Near
Eastern Studies (CA-AS)
Spring, 4 credits. Requirement for NES majors. R. Brann.
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—we will 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 4605 Contesting Identities in
Modern Egypt (also HIST 4091) ®
(CA-AS)
Fall. 4 credits. Z. Fahmy.
This seminar examines the dynamics of modern collective identities that dominated the Egyptian public sphere in the long 20th century. We will explore the underpinnings and formation of territorial Egyptian nationalism, pan-Arabism and Islamism through close readings and class discussions of important theoretical, historiographical and primary texts.

[NES 4639 Readings in Arabic Historical
Texts (also RELST 4639) ® (CA-AS)
Fall. 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. Z. Fahmy.
The primary emphasis of this discussion seminar is the historical development of gendered identities and the fluid manner in which different Middle Eastern communities responded to shifting ideas of sexuality, reproduction, and the family. Our focus of inquiry will be on themes that involve and relate to women, both directly and indirectly. We will particularly examine how and why women’s roles change over time, as well as gendered systems and institutions, 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 that 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 4731 Topics in Islamic Art: The
Almoravids, the Almohads, and the
“Sunni Revival” (also ARTH 4331,6331, NES 6731) ® (CA-AS)
Fall. 4 credits. Next offered 2009–2010.

[NES 4738 Imagining the Mediterranean
(also COML 4960, JWST 4730) ®
(LA-AS)
Spring. 4 credits. G. Holot-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 that 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 4787 Hellenistic Jewish Literature
(also CLASS 4605, JWST/RELST
4787) ® (LA-AS)
Fall. 4 credits. L. Jovanovic.
Apart from translating the Hebrew Scriptures into Greek, Hellenistic Judaism was prolific in its production of other literature in Greek as well. Romances, philosophical treatises, and biblical stories grace this rich and diverse corpus. In this seminar, we will read, in English translation, from a selection of such texts, including the Letter of Aristeas, Joseph and Aseneth, Josephus’ Antiquities, LXX, The Testament of 12 Patriarchs, the works of Philo

[NEAR EASTERN STUDIES 623]
and Atharpanus, among others. We will explore where these texts discourse both with the ancient biblical material and their adopted Greek culture by examining their interpretations of biblical figures and events, by situating the texts in their cultural context, and by applying the methodologies of modern scholarship. Particular attention will be devoted to individual topics, such as the concern for Jewish self-definition, monotheistic faith, gender dynamics, political convictions, and artistic expression. An optional third hour will be devoted to reading from the texts in the original language and discussing their linguistic and textual problems. We will look at the idiosyncrasies of the Greek of the LXX and explore its use in different genres of Hellenistic Jewish literature. At least a year of ancient Greek is required for this section of the course.

NES 4903 Methods in the Study of the Ancient Near East (also ARKEO 4903, JWST 4903)  
Spring. 4 credits. Limited to 15 students. 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 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 2009–2010. R. Brann.]

NES 6960 Rites of Contact: Emergent German Literature and Critical Method (also COML/GERST 6960)  
Spring. 4 credits. L. Adelson.  
For description, see GERST 6960.

NES 6991–6992 Independent Study: Graduate Level  
Fall and spring. Variable credit.  
Prerequisite: permission of instructor. Staff.

NEPALI  
See "Department of Asian Studies."

PALI  
See "Department of Asian Studies."

PHILOSOPHY  


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 (after fall 1990) 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, 2000s, 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 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 both semesters of their senior year to write a satisfactory honors essay. PHIL 4900 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 1110 Introduction to Philosophy # (KCM-AS)
Fall, spring, and summer. 3 credits. Fall, K. Bennett; spring, N. Sturgeon; summer, K. Bennett and M. Eklund.
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 1450 Contemporary Moral Issues (KCM-AS)
Summer. 3 credits. 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 1512 Philosophy and Film (also FILM 1512)
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 1910 Introduction to Cognitive Science (also COGST 1101, CS 1710, LING 1170, PSYCH 1102) (KCM-AS)
Fall. 4 credits. M. Spivey.
For description, see COGST 1101.

PHIL 1940 Global Thinking (also GOVT 2947) (KCM-AS)
Fall. 4 credits. R. Miller.
An interdisciplinary study of central issues of international justice. Topics discussed may include global climate change, economic development in the era of globalization, the ethics of war, fairness in international cooperation, and social, political and economic processes.

PHIL 2200 Ancient Philosophy (also CLASS 2661) # (KCM-AS)
Fall and summer. 4 credits. Fall, T. Brennan; summer, S. MacDonald.
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. D. Pereboom.
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 2300 Puzzles and Paradoxes (KCM-AS)
Spring. 4 credits. Staff.
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)
Fall. 4 credits. T. Irwin.
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 (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. Prerequisites: none. Open to freshmen. 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 2661) (KCM-AS)
Spring. 4 credits. Limited to 40 students. Open to all undergraduates; freshmen by permission of instructor. S. Pritchard.
For description, see BSOC 2661.

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 2520 Asian Philosophy
Fall. 4 credits. S. Lee.
An introductory survey of various Asian philosophical traditions. Topics will include the foundations of the Indian philosophical tradition expressed in the Vedas and the Upanishads; the origination and development of Buddhist philosophy; the Chinese philosophical tradition with an emphasis on Confucianism and Taoism. Readings will include primary sources as well as secondary texts.

PHIL 2610 Knowledge and Reality (KCM-AS)
Spring. 4 credits. Prerequisite: none. Open to freshmen. Staff.
An introduction to philosophical questions about the nature of knowledge and reasonable belief, about sources of knowledge and reasonable belief such as perception, memory, reasoning and testimony, and about the extent and source of our knowledge about our own minds.

PHIL 2620 Introduction to Philosophy of Mind (KCM-AS)
Fall. 4 credits. N. Silins.
An introductory survey of 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 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 the 2000 level or above; or permission of the instructor. G. Fine.
We will study several of Plato’s major dialogues, including the Apology, the Meno, Phaedo, and Republic. Topics to be covered include: knowledge and reality; morality and happiness; the nature of the soul.

PHIL 3203 Aristotle (also CLASS 3664) # (KCM-AS)
Fall. 4 credits. Prerequisite: at least one PHIL course at the 2000 level or above; or permission of the instructor. T. Brennan.
We will study several of Aristotle’s major works, including the Categories, Physics, Posterior Analytics, Metaphysics, and Nicomachean Ethics. Topics to be covered include: nature and change; form and matter; the nature of happiness; the nature of the soul; knowledge and first principles.

PHIL 3220 Modern Rationalism
Spring. 4 credits. Prerequisite: One PHIL course, preferably 2220, 3221, or an equivalent. Staff.
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 3230 Kant # (KCM-AS)
Fall. 4 credits. Prerequisite: Two courses from the following list: 2200, 2220, 2240, 2250, 3202, 3203, 3204, 3210, 3220, 3221; otherwise, permission of instructor. A. Chignell.
An intensive study of the metaphysical and epistemological doctrines of the Critique of Pure Reason. Some editions of the course may also consider Kant’s ethical views as laid out in the Groundwork of the Metaphysics of Morals and related works.

PHIL 3260 History of Analytic Philosophy
Spring. 4 credits. Prerequisite: two previous philosophy courses or permission of instructor. Staff.
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)
Spring. 4 credits. H. Hodges.
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 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 3510 Aesthetics (LA-AS)
Spring. 4 credits. C. Mag Uidhir.
This course will cover main issues in contemporary philosophy of art at an intermediate to advanced level. Topics may include definitions of art, intention and interpretation, fictionality, values of art, aesthetics of nature, as well as specific issues in the philosophy of music, literature, and film.

PHIL 3640 Metaphysics (KCM)
Fall. 4 credits. K. Bennett.
This course will cover various topics in metaphysics at an intermediate to advanced level. These topics may include causation, persistence, modality, time, properties, dispositions, dependence relations, etc.

PHIL 3710 Philosophy of Language (also LING 3332)
Fall. 4 credits. R. Boyd.
This course will cover various topics in the philosophy of language. Topics may include names, definite descriptions, belief ascriptions, truth-conditional theories of meaning, pragmatics, and metaphor. Both historical and contemporary readings are considered.

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. A. Chignell.

Advanced Courses and Seminars

These courses are offered primarily for majors and graduate students.

PHIL 4003 German Philosophical Texts
Fall and spring. 4 credits. Prerequisites: Basic reading (not necessarily speaking) knowledge of German, and the permission of the instructor. Open to upper-level undergraduates.
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 4220 Modern Philosophy
Fall. 4 credits. S. Lee.
Advanced discussion of topics or authors in "modern" Western philosophy (roughly the 17th and 18th centuries).

PHIL 4310 Mathematical Logic (also MATH 4810) (MQR-AS)
Fall. 4 credits. Staff.
For description, see MATH 4810.

PHIL 4610 Epistemology (KCM-AS)
Spring. 4 credits. Staff.
An intensive seminar on a special topic in epistemology to be determined by the instructor. Potential topics include: what are the limits of knowledge? What is the extent and nature of our knowledge of our own minds? How do we gain knowledge through particular sources such as perception, testimony, memory, or reasoning? Readings may be drawn from historical or contemporary sources.

PHIL 4710 Problems in the Philosophy of Language
Fall. 4 credits. W. Breckenridge.
For description, see department web site.

PHIL 4720 Pragmatics (also LING 4425) (KCM-AS)
Fall. 4 credits. D. Abusch.
For description, see LING 4425.

PHIL 4810 Problems in the Philosophy of Science (KCM-AS)
Spring. 4 credits. R. Boyd.
Advanced discussion of some problem or problems in the Philosophy of Science.

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 6010 Greek Philosophical Texts (also GREEK 7161)
Fall and spring. 4 credits. Prerequisites: knowledge of Greek and permission of instructor. Staff.
Reading and translation of Greek philosophical texts.

PHIL 6020 Latin Philosophical Texts (also LATIN 7262, RELST 4100)
Fall and spring. Variable credit.
Prerequisites: knowledge of Latin and permission of instructor. Staff.
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. A. Chignell.
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 6410 Seminar in Ethics and Value Theory
Fall and spring. 4 credits. Prerequisite: this course is a seminar for Philosophy graduate students; others may enroll only with permission of instructor. Fall, N. Sturgeon; spring, E. Taylor. Graduate seminar covering a topic in ethics and value theory.

PHIL 6420 Seminar in German Philosophy
Spring. 4 credits. A. Chignell. Graduate-level seminar covering topics in German philosophy.

PHIL 6430 Seminar in Social and Political Philosophy
Spring. 4 credits. R. Miller. Graduate seminar covering a topic in social and political philosophy.

PHIL 6640 Seminar in Metaphysics
Fall. 4 credits. D. Pereboom. Graduate seminar covering a topic in metaphysics.

PHIL 6710 Seminar in Philosophy of Language
Spring. 4 credits. W. Breckenridge. Graduate seminar covering a topic in philosophy of language.

PHYSICS

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.

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.

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

The principles 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.

The core 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 economics 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, 3350,
3360, 4410, or ASTRO 4410, (3) an intermediate course in classical mechanics (PHYS 3314 or 3318), and (4) an intermediate course in electromagnetism (PHYS 3523 or 3527). Students who complete the PHYS 1112–2213–2214 or PHYS 2207–2213–2214 introductory sequence are advised to complete the 1-credit core 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

Typical Physics Course Sequences (other sequences are also possible)

<table>
<thead>
<tr>
<th>Semester</th>
<th>No AP math or physics</th>
<th>1 year AP calculus and good HS physics</th>
<th>Outside concentrators</th>
<th>Outside concentrators (alternate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st – Fall</td>
<td>1112</td>
<td>1116</td>
<td>1112</td>
<td>4213</td>
</tr>
<tr>
<td>2nd – Spring</td>
<td>2213</td>
<td>2217</td>
<td>2414, 4216</td>
<td>2213</td>
</tr>
<tr>
<td>3rd – Fall</td>
<td>2214, 2216</td>
<td>2218</td>
<td>3x0, 3x0</td>
<td>2214, 2216</td>
</tr>
<tr>
<td>4th – Spring</td>
<td>3516, 3x0</td>
<td>3317, 3327, 3x0</td>
<td>3316, 3x0, 3316</td>
<td>3314, 3316</td>
</tr>
<tr>
<td>5th – Fall</td>
<td>3317, 3327, 3x0</td>
<td>3317, 3327, 3x0</td>
<td>3314, 3x0, 3316</td>
<td>3314, 3x0</td>
</tr>
<tr>
<td>6th – Spring</td>
<td>3314/3318, 4443</td>
<td>3318, 4443</td>
<td>3317, 3323</td>
<td>3314, 3323</td>
</tr>
<tr>
<td>7th – Fall</td>
<td>3341, 4410</td>
<td>3341, 4410</td>
<td>3316, 3323</td>
<td>3317, 3323</td>
</tr>
<tr>
<td>8th – Spring</td>
<td>Elective(s)</td>
<td>Elective(s)</td>
<td>3x0, 3x0</td>
<td>3x0, 3x0</td>
</tr>
</tbody>
</table>

- 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 PHYS 1112–2217–2218 and PHYS 1116–2213–2214 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 PHYS 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 department office for advice in planning a course program.
- Physics electives for the major include 3360, 4444, 4445, 4455, 4480, 4490, 5525, 5553, 5561, 5572, 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.

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, 1209, or 1210 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. Conceptual 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. B. Richardson.
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 text questions at our web site. Unit testing is designed to measure mastery with a limit of three test tries. Topics for 1101: kinematics, forces and dynamics, momentum, energy, fluid mechanics, waves and sound, thermal physics, kinetic theory, and thermodynamics. The course 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. B. Richardson.
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 text 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. Next offered 2009–2010. Basic principles treated quantitatively but without calculus. Topics include kinematics, forces and Newton's laws, momentum, angular momentum, and energy; thermal physics and fluid mechanics; sound and waves; thermodynamics.

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: co-registration in MATH 1920. Fall, J. Thom; spring, staff; summer, staff.
Covers the mechanics of particles with focus on kinematics, dynamics, conservation laws, central force fields, periodic motion.

PHYS 1116 | Physics I: Mechanics and Special Relativity (PBS)
Fall, spring. 4 credits. More analytic than PHYS 1112 introductory physics for students who are comfortable with deeper, somewhat more abstract approach; intended mainly but not exclusively for prospective majors in physics, astronomy majors, or applied and engineering physics majors. Prerequisites: good secondary school physics course, familiarity 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. Prerequisite: PHYS 1112, 1116 or 2215 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 that is an 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. 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. P. Stein.
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 development of the 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 melded 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 at first, offering a humanistic perspective.

PHYS 1204 | Physics of Musical Sound (also MUSIC 2111) (PBS)
Spring. 3 credits. Intended 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, scales, intervals and tunings; hearing, room acoustics; reproduction of sound. Sound 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 2207 | Fundamentals of Physics I (PBS)
Fall. 4 credits. Prerequisites: high school physics plus MATH 1120 or 1910, or solid grasp of basic notions of introductory calculus. Corequisite: math course approved by instructor. M. Liepe.
A two-semester introduction to physics, intended for students majoring in an analytically oriented biological science, a physical science, or mathematics. 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 fundamentals of physics and the basic analytical and scientific communication skills required by all scientists.
PHYS 2208  **Fundamentals of Physics II (PBS)**  Fall, spring. 4 credits. Prerequisites: PHYS 2207 or 1112 or 1101; substantial contact with introductory calculus (e.g., MATH 1120 or 1910). 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. R. Fullbright.


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. Fall, M. Perelstein; spring, P. Krassicky; 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: Optics, Waves, and Particles (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. Brota.

Physics of oscillations and wave phenomena. Driven oscillations and resonance, mechanical 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 quantum physics with applications to phenomena in physics, engineering, and biology.

PHYS 2216  **Introduction to Special Relativity**  Fall, spring. Classes are held in the first 5–7 weeks. 1 credit. Enrollment may be limited. Co-registration in this course is required 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, 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 *An Introduction to Mechanics* by Kleppner and Kolenkow.

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 questionnaire 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. 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.

At the level of *Electricity and Magnetism*, Vol. 2, by Purcell (Berkeley Physics Series).

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, J. C. Davis; 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 3316  **Basics of Quantum Mechanics (PBS)**  Fall, spring. 3 credits. Prerequisite: PHYS 3316. K. Schwab.

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 3317  **Applications of Quantum Mechanics (PBS)**  Fall. 3 credits. Prerequisite: PHYS 3316. K. Schwab.

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; quantization of systems; 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. P. Brouwer.

PHYS 3330 Modern Experimental Optics (also AEP 3300) (PBS)
Fall. 4 credits. Limited enrollment.
Prerequisite: PHYS 2214 or equivalent.
G. Hoffstaetter.
Practical laboratory course in basic and modern optics. The six 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. At the level of Optics by Hecht.

PHYS 3341 Thermodynamics and Statistical Physics (PBS)
Fall. 4 credits. Prerequisites: PHYS 2214, 3316, and MATH 2940. I. Cohen.
Course in 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 non-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, 2215, 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. Bazrov.

PHYS 3376 Introduction to General Relativity (also ASTRO 4445) (PBS)
Fall. 4 credits. Offered as alternative to more comprehensive, two-semester graduate sequence PHYS 6553 and 6554.
L. Allmiller.
One-semester introduction to general relativity, which teaches physics concepts and phenomenology while keeping mathematical formalism to a minimum. General relativity is a fundamental cornerstone of physics that underlies several of the most exciting areas of current research. These areas include: theoretical high-energy physics and the search for a quantum theory of gravity, relativistic astrophysics, and in particular, cosmology, where there have been several ground-breaking observations over the last few years. It uses the textbook Gravity: An Introduction to Einstein's General Relativity by Hartle.

PHYS 4400 Informal Advanced Laboratory
Fall, spring. 1–3 credits, variable.
Prerequisites: two years physics or permission of instructor. Fall, P. McEuen; spring, D. Hartill.
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. Fall, P. McEuen; spring, D. Hartill.
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 3327 or 3325; and PHYS 3316 and AEP 3210 or appropriate mathematics course(s); co-registration 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 more comprehensive, two-semester graduate sequence PHYS 6553 and 6554.
L. Allmiller.
One-semester introduction to general relativity, which teaches physics concepts and phenomenology while keeping mathematical formalism to a minimum. General relativity is a fundamental cornerstone of physics that underlies several of the most exciting areas of current research. These areas include: theoretical high-energy physics and the search for a quantum theory of gravity, relativistic astrophysics, and in particular, cosmology, where there have been several ground-breaking observations over the last few years. It uses the textbook 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 7900 highly desirable but not required. J. Silcox.
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 co-registration in PHYS 3318 or permission of instructor.
Usually offered every other spring.
Most non-quantum 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 dimensionalities. 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 Tulman.

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 2009–2010. G. Hoffstaetter.
Fundamental physical principles of particle accelerators and enabling technologies, with a focus on basic effects in linear and circular accelerations as high-energy physics colliders and X-ray sources.]

PHYS 4480 Computational Physics (also ASTRO 7690, 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 only. 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)]
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 4487 Selected Topics in Accelerator Technology (also PHYS 7687)]
Fall. 2 credits. Prerequisite: PHYS 3323 or 3327. S–U grades only. Next offered 2009–2010.
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)
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 and X-ray experiments, 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 6500 Informal Graduate Laboratory
Fall, spring. Variable to 2 credits.
Prerequisite: permission of instructor. Fall, P. McEuen; spring, D. Hartill.
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 analog 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.
This rigorous 35-hour (one-week) course is designed specifically for secondary science teachers to increase their scientific content knowledge as aligned with the NYS Intermediate core curriculum. The course will promote the interaction of teachers with scientists to foster a greater understanding of the scientific process through the exposure to real-world research. Presentations and discussions will cover topics appropriate to the curriculum and will emphasize technological advancements and applications. Topics include properties of matter, energy and electromagnetic spectrum, conservation of energy, electricity and magnetism, science process skills, scientific inquiry and engineering design. Model hands-on laboratory activities designed to increase student learning and will integrate inquiry-based pedagogical techniques. This course will not satisfy any Cornell Physics degree requirements.

PHYS 6510 Advanced Experimental Physics
Fall, spring. 3 credits. Optional lab associated with PHYS 4410 available. Fall, P. McEuen; spring, D. Hartill.
About 60 different experiments are available in acoustics, optics, spectroscopy, electrical circuits, electronics and ions, 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 research 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)]
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, E. Flanagan.
A comprehensive introduction to Einstein’s theory of relativistic gravity. Topics include differential geometry, foundations of general relativity, formulation of laws of physics in gravitational fields, conservation laws, and physical predictions and experimental tests of the theory. 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 the instructor.
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. Topics include relativistic stars, gravitational collapse and black holes, gravitational waves, solar system tests of gravitational theories, foundations of numerical relativity, cosmological models and their perturbations, alternative theories of gravity, and black hole thermodynamics.

PHYS 6561 Classical Electrodynamics
Fall. 3 credits. C. C. Tsao.
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.

PHYS 6572 Quantum Mechanics I
Fall. 4 credits. T. M. Yan.
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 6560 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), as well as 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. Y. Grossman.
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.

PHYS 7646 Topics in High-Energy Particle Physics
Spring. 3 credits. Staff.
Course 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, only grad 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. C. Csaki.
A continuation of PHYS 7651. Introduces more advanced methods and concepts in quantum field theory. Topics include renormalization, non-Abelian gauge theories, functional integral methods, and quantization of non-Abelian gauge theories, spontaneous symmetry breaking, anomalies, solitons, and instantons. 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 Condensed Matter Physics
Spring. 3 credits. Prerequisites: PHYS 6562, 6574, 7655, 7656, 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 nanoribbons, 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)
For description, see PHYS 4456.

PHYS 7661 Advanced Topics in High-Energy Particle Theory
Fall. 3 credits. Prerequisite: PHYS 7652. S–U grades only. Next offered 2009–2010. 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: Astrophy Gas Dynamics (also ASTRO 7699)
For description, see ASTRO 7699.

PHYS 7667 Theory of Stellar Structure and Evolution (also ASTRO 6560)
Fall. 4 credits. D. Chernoff.
For description, see ASTRO 6560.

PHYS 7680 Computational Physics (also PHYS 4480)
For description, see PHYS 4480.

PHYS 7681-7689 Special Topics
Offers are announced each semester. Typical topics are group theory, analyticity in particle physics, weak interactions, superfluids, stellar evolution, surface physics, Monte Carlo methods, low-energy quantum physics, magnetic resonance, phase transitions, and the renormalization group.

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. C. Myers.
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 7687 Selected Topics in Accelerator Technology (also PHYS 4487)
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
The major areas of psychology represented in the department are perceptual and cognitive psychology, biopsychology, and personality and social psychology. These areas are very broadly defined, and the courses are quite diverse. Biopsychology includes animal learning, neuropsychology, interactions between hormones, other biochemical processes, and behavior. Perceptual and cognitive psychology includes such courses as cognition, perception, memory, and psycholinguistics. Personality and social psychology is represented by courses in social psychology and personality (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); 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. Perceptual cognition and development (PCD)
2. Behavioral and evolutionary neuro science (BEN)
3. Personality and social 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. Perceptual cognition and development: PSYCH 1102, 2050, 2090, 2140, 2150, 2810, 3050, 3160, 3420, 4120, 4140, 4160, 4180, 4200, 4270, 4280, 4320, 4350, 4360, 4650, 4920.

2. Behavioral and evolutionary neuro science: PSYCH 2230, 3220, 3240, 3260, 3270, 3310, 3980, 4200, 4240, 4250, 4290, 4330, 4350, 4400, 4440, 4920.

3. Personality and social psychology: PSYCH 2650, 2750, 2800, 3250, 3270, 3280, 3800, 3850, 4050, 4230, 4300, 4520, 4810, 4820, 4850, 4910.

4. Other courses: PSYCH 1101, 1990, 2820, 3470, 3500, 4100, 4400, 4410, 4700, 4710, 4720, 4730, 4780. 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. (See the section below on the statistics requirement.)
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 one of the following courses in psychology: PSYCH 2650, 2750, 2800, 3250, 3270, 3280, 3800, 3850, 4050, 4230, 4300, 4520, 4810, 4820, 4850, 4910.

Concentration in personality and social 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 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 focus and quality. Th e 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 General Information 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 lecture mandatory. Students who wish to take disc seminar should also enroll in PSYCH 1105. 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). B. Bienvenu.

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 BIOME/COGST 1110) (PSB)**

Spring. 3 credits. Letter grades only. 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. Next offered 2009–2010. E. Atkins Regan and R. Hoy.

For description, see COGST 1110.

**PSYCH 1560: Computing in the Arts (also CISC/ENGRI 1610, DANCE 1540, FILM 1750, MUSIC 1465)**

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 stimulation-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 biological 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)**

Fall. 3 credits. Limited to 175 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: sophomores, juniors, 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 (PSB: 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)**

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.


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 2600. M. W. J. Hauaguerd. 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.
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 system, 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. Acquaints the student with the elements of statistical description (e.g., measures of average, variation, correlation) and, more importantly, 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 2009–2010 B or Capp. For description, see NS 3610

**PSYCH 3850 The Psychology of Emotion (SBA-AS)**

Fall. 3 credits. D. J. Field. Much recent research has focused on people's ability to remember—and often to misremember—their own life experiences. This course reviews that research, including such social phenomena.

**PSYCH 4200 Human Perception: Applications to Computer Graphics, Art, and Visual Display (also COGST 4240, PSYCH 4240, VISST 3342)**

Fall. 3 or 4 credits. 4-credit option involves term paper. Highly recommended: PSYCH 4240. Graduate students, see PSYCH 6420. D. J. Field.
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 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)]

[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. Judgment pervades everyday experience. Can this person be trusted? Does this relationship have promising future? Is this economy likely to flourish? This course examines how people answer such questions by examining—in depth—classic and contemporary scholarship on the subject. Readings are mostly primary sources.

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 Uts Hall.

PSYCH 4120 Laboratory in Cognition and Perception (also COGST 4120, PSYCH 6120) (KCM-AS)
Spring. 4 credits. Limited to 15 students. Prerequisite: statistics and one course in psychology 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 4140 Comparative Cognition (also COGST 4140, PSYCH 7140) (KCM-AS)
Spring. 3 or 4 credits. 4-credit option involves annotated bibliography or creation of relevant web site. Prerequisites: PSYCH 2050, 2090, 2140, 2230, 2920, or permission of instructor. Graduate students, see PSYCH 7140. Next offered 2009–2010. T. Gilovich. Examines some of the conceptual and empirical work resulting from and fueling the recent surge of interest in animals’ thinking. Specific topics may include whether nonhumans behave intentionally; whether they show concept and category learning, memory, and abstract thinking similar to that of humans; the role of social cognition in the evolution of intelligence; and whether animals are conscious or self-aware. Evidence from communication studies in which animal signals provide a “window on the mind” plays a strong role in the deliberations, including studies of naturally occurring signaling in various species and experiments in which nonhumans are trained in human-like language behavior. Cognition in nonhuman primates is a specific focus throughout. The course is a mix of lecture and discussion, emphasizing the latter as much as possible.

[PSYCH 4160 Modeling Perception and Cognition (also COGST 4160, PSYCH 5160)]
Spring. 4 credits. Prerequisites: PSYCH 2050, 2090, 2140, or 2150, or permission of instructor. Graduate students, see PSYCH 5160. Next offered 2009–2010. T. Gilovich. Offers a survey of several computational approaches to understanding perception and cognition. Explores linear systems analysis, connectionist models, dynamical systems, and production systems, to name a few. Emphasis is placed on how complex sensory information is represented in these models, as well as how it gets processed. Covers computational accounts of language processing, language acquisition, visual perception, and visual development, among other topics. Students complete a final project that applies a computational model to some perceptual/cognitive phenomena.

PSYCH 4180 Psycho 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 musical background desirable but no specific musical skills required. Graduate students, see PSYCH 6180. C. L. Krumbhans. 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)
Spring. 3 credits. Prerequisites: PSYCH 2230 or HD 2200 and BIONB 2220. 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. 4 credits. Prerequisites: intended for juniors, seniors, and graduate students. 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 different 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 BIOL 1101–1102 and permission of instructor. S–U or letter grades. Offered alternate years. B. L. Finlay. Offered alternate years. B. L. Finlay. Offered alternate years. B. L. Finlay. Offered alternate years. B. L. Finlay. Offered alternate years. B. L. Finlay. Offered alternate years. B. L. Finlay. Offered alternate years. B. L. Finlay. Offered alternate years. B. L. Finlay. Studies the relationship between structure and function in the central nervous system. Stresses the importance of evolutionary and mechanistic approaches for understanding the human behavior and cognition. Focuses on issues in cognitive neuroscience, including mechanisms of perception, particularly vision, and the neuropsychology of everyday acts involving complex cognitive skills such as recognition of individuals, navigation in the world, language, memory, social interaction, and consciousness.

PSYCH 4260 Learning Language (also COGST 4260, PSYCH 7260) (KCM-AS)
Spring. 4 credits. Prerequisite: PSYCH 2140 or permission of instructor. Letter grades only. S. Edelman. A survey of a promising new synthesis in the understanding of the cognitive function that is at the core of the human nature: language. The material focuses on two aspects of the study of language: (1) psycholinguistic data and their interpretation, and (2) algorithmic studies and computational modeling. In psycholinguistics, students will read key papers that shed light on the nature of linguistic knowledge (“grammar”) possessed by normal adult speakers, and on the learning of this knowledge by children. In computation, the focus is on learning grammar from raw data. The common thread to this course is realism: in psycholinguistics, we shall consider only those results obtained empirically by established psychological procedures (as opposed to intuition, either of experts or of lay speakers); in computation, the only approaches of interest to us are those that are algorithmically tractable, and that are effective when applied to realistic data.
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 6280 or letter grades. Offered alternate years; next offered 2009–2010. 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 4436, PSYCH 6280)
Fall. 3 credits. Prerequisite: senior standing or permission of instructor. Graduate students, see PSYCH 6280. Offered alternate years. T. M. Christiansen. Connectionist psycholinguistics involves using artificial "neural" networks, which are inspired by brain architecture, to model empirical data on the acquisition and processing of language. As such, connectionist psycholinguistics has had a far-reaching impact on language research. This course surveys the state of the art of connectionist psycholinguistics, ranging from speech processing and word recognition, to inflectional morphology, sentence processing, language production and reading. An important focus of discussion is the methodological and theoretical issues related to computational modeling of psychological data. Furthermore, the course discusses the broader implications of connectionist models of language, not only for psycholinguistics, but also for computational and linguistic perspectives on language.

PSYCH 4300 Effects of Aging on Sensory and Perceptual Systems (also BION 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 6510. P. A. Schiller. 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. Course is taught using the Socratic method, in which the instructor asks questions of the students. Students read, analyze, and discuss in class difficult original literature dealing with the subject matter on hand. Readings are from Internet sites, a course packet, materials on reserve, and from the course Blackboard site. Students are expected to come to each class having already done and thought about the assigned readings. They think of each class as 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 2290 or BION 2220) and one introductory 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 animals sensors and circuits, the active allocation of cognitive and physiological resources to selective sampling, and the integration of sampled data, prior knowledge, and new 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 4400 The Brain and Sleep (also PSYCH 6400)
Fall. 4 credits. Prerequisites: at least PSYCH 2230 or BION 2210. Recommended: additional course in biology, biopsychology, or neurobiology. S–U or letter grades. Graduate students, see PSYCH 6400. H. S. Porte. Taking a comparative evolutionary perspective, this course examines the neural events that instigate, maintain, and disturb the states and rhythms of sleep in various species. Emphasizing human data where possible, special topics include sleep deprivation and the biological functions of sleep; biologically interesting deviations from normal sleep; and the cognitive neuroscience of sleep, including sleep's role in learning and memory.

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. Using computerized data analysis, students complete weekly laboratory reports and a collaborative term project. Sleep recordings are done during the day or evening when possible. In addition, overnight recording sessions are required.

PSYCH 4440 Neural Computation (also BION 4440)
Spring. 3 credits. Limited to 10 students. Prerequisites: PSYCH 2230 or BION 2220, or permission of instructor. S–U or letter grades. Offered alternate years. 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 12 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. Bern.

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 (also COGST 4650, PSYCH 6650) (KCM-AS)

Spring. 4 credits. Graduate students, see PSYCH 6650. Offered alternate years; next offered 2009–2010. S. Edelman.

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 4720 Multiple Regression

Spring, weeks 1–7. 2 credits. Prerequisite: one solid semester of introductory statistics. Recommended: analysis of variance. Staff.

Covers uses and misuses of multiple regression in causal analysis, path analysis, and prediction. Emphasis is on analyzing data collected under uncontrolled conditions. Includes linearity, indicator variables, sets, adjusted and unadjusted R2, hierarchical analysis, overcontrol, and experimental design. Students may use the Minitab, SPSS, Stata, SAS, or Stystat statistics packages.

PSYCH 4730 General Linear Model

Spring, weeks 8–14. 2 credits. Prerequisite: PSYCH 4720 or equivalent. Staff.

Topics include multivariate categorical variables, corrections for multiple tests, diagnostic methods, nonlinear relationships, interaction, main and simple effects, and basic power analysis. Students may use the Minitab, SPSS, Stata, SAS, or Stystat.

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 2009–2010. M. Goldstein.

Explores the influence of parenting skills and styles on the development of infants and children. By studying parents and their infants together, the family can be viewed as a system in which the members engage in reciprocal stimulation and regulation of learning and behavior. Patterns of interaction within a family serve as a source of developmental change in infants. Such a system is influenced by internal and external forces. This course examines internal factors such as the biology of parenting and mechanisms of social learning in infants. Also studies the influence of external factors on family life, such as socioeconomic status and changes in family structure (e.g. single vs. dual parenting). Finally, it examines and evaluates the role of public policies and intervention strategies that impact parents and children.

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 6610. D. T. Regan.

Readings are primary sources, 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. Dunn.

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 4890 Seminar: Beliefs, Attitudes, and Ideologies (also PSYCH 6890) (CA-AS)

Fall. 4 credits. Prerequisites: admission by application during spring pre-registration period for fall semester. Priority given to juniors, seniors, and graduate students.


Course in cultural analysis examining the properties of beliefs and attitudes, how they are formed and changed, the psychological functions they serve, and how they get organized into ideologies. Several specific issues involved in America's “culture wars” are examined, such as abortion, gender, sexual orientation, and affirmative action. Other topics include cultural relativism, utilitarian ethics, and the ideology of science. Participants write weekly commentaries on the readings and a term paper examining a particular ideology.

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 psychology 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 reporting (v) 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.
Advanced Courses and Seminars

Advanced courses 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 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 Seminars**

- **PSYCH 6000 General Research Seminar**
  Fallg. 4 credits. Non-arts graduate students only. J. E. Cutting.

- **PSYCH 6050 Perception**
  (Also PSYCH 2050)
  Spring. 4 credits. D. J. Field.

- **PSYCH 6100–6110 Perception**
  (Also PSYCH 4120)
  Spring. 4 credits. F. S. Edelman.

- **PSYCH 6140 Cognitive Psychology**
  (Also COGST/PSYCH 2140, COGST 6140)
  Fall. 3 credits. B. P. Halpern.

- **PSYCH 6160 Modeling Perception and Cognition**
  (Also COGST/PSYCH 4160)

- **PSYCH 6180 Psychology of Music**
  (Also MUSIC 4181, PSYCH 4180)
  Fall. 4 credits. C. Krumhansl.

- **PSYCH 6181 Topics in Psycholinguistics**
  Spring. 3 credits. D. Smith.

- **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**
  Spring. 4 credits. H. S. Porte.

- **PSYCH 6230 Hormones and Behavior**
  Spring. 4 credits. D. Smith.

- **PSYCH 6250 Cognitive Neuroscience**
  (Also PSYCH 4250)
  Fall. 4 credits. B. L. Finlay.

- **PSYCH 6260 Evolution of Human Behavior**
  (Also PSYCH 3260)
  Spring. 4 credits. R. E. Johnston.

- **PSYCH 6270 Evolution of Language**
  (Also COGST/PSYCH 4270)

- **PSYCH 6271 Topics in Biopsychology**
  Fall or spring. Staff.

- **PSYCH 6280 Connectionist Psycholinguistics**
  (Also COGST/PSYCH 4280, LING 4429/6628)
  Fall. 3 credits. W. M. Christiansen.

- **PSYCH 6290 Offaction and Taste: Structure and Function**
  (Also BIONB/PSYCH 4290)
  Spring. 4 credits. B. P. Halpern.

- **PSYCH 6300 Moral Reasoning**
  (Also PSYCH 4300)
  Spring. 4 credits. D. Pizarro.

- **PSYCH 6301 Structure in Vision and Language**
  (Also COGST 6300)
  Spring. 4 credits. Graduate seminar. Limited to 20 graduate students. Prerequisites: graduate standing; course each in cognitive psychology, linguistics, computer science, or permission of instructor. Offered alternate years; next offered 2009–2010. S. Edelman.

One of the central puzzles of cognition is the manner in which brains deal with structured information such as scenes composed of a variety of objects, or sentences composed of words and phrases. The processing of structure by the brain is constrained by the neuronal architecture, as well as by general principles of information processing that are studied in computer science. This course focuses on insights from these different disciplines, striving for understanding couched in abstract computational terms, yet compatible with the basic neurobiological constraints, with behavioral data, and with philosophical intuition.

- **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. Devogod.

- **PSYCH 6340 Sensory Construction**
  (Also PSYCH 4340)
  Spring. 3 credits. T. Cleland.

- **PSYCH 6350 Evolutionary Perspectives on Behavior**

- **PSYCH 6400 The Brain and Sleep**
  (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**
  (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)

- **PSYCH 6780 Parenting and Child Development**
  (Also PSYCH 4780, HD 4440)

- **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. Bem.

- **PSYCH 6850 The Self**
  (Also PSYCH 4850)
  Spring. 4 credits. D. Dunning.

- **PSYCH 6890 Seminar: Beliefs, Attitudes, and Ideologies**
  (Also PSYCH 4900)

- **PSYCH 6910 Research Methods in Psychology**
  (Also COGST/PSYCH 4910)
  Spring. 4 credits. V. Zayas.

- **PSYCH 6920 Sensory Function**
  (Also BIONB/PSYCH 4920)

- **PSYCH 6960 Introduction to Sensory Systems**
  (Also BIONB/PSYCH 3960)

- **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 7140 Comparative Cognition**
  (Also COGST/PSYCH 4140)

- **PSYCH 7160 Auditory Perception**
  (Also PSYCH 3160)
  Spring. 4 credits. C. L. Krumhansl.
QUECHUA

See "Romance Studies."

RELIGIOUS STUDIES MAJOR

D. Boucher, director; A. Blackburn, R. Brann,
C. M. Carmichael, K. Clinton, 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. W. Law, S. MacDonald,
K. S. March, L. Monroe, L. Moore, D. I. Owen,
D. S. Powers, C. Robinson, P. S. Sangren,
S. Tootrwa, 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.

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 form 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/belief 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/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.

   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/belief 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

Courses Approved for the Major

Sponsored by Religious Studies:

RELST 2110 Black Religious Traditions: Sacred and Secular (also AMST/HIST 2110)

RELST 2204 Quranic Arabic (also NES 2204)
Spring. 4 credits. M. Younes. For description, see NES 2204.

RELST 2212 Quran and Commentary (also NES 2212)
Spring. 3 credits. D. Powers. For description, see NES 2212.

RELST 2250 Introduction to Asian Religions (also ASIAN 2250) @ # (HA-AS)
Fall. 3 credits. D. Boucher. For description, see ASIAN 2250.

RELST 2277 Meditation in Indian Culture (also ASIAN 2277) @ # (HA-AS)
Spring. 3 credits. D. Gold. For description, see ASIAN 2277.

RELST 2420 Religion and Politics in American History (also HIST/AM ST 2420)
Fall. 4 credits. Limited to 15 students. Prerequisite: permission of instructor. L. Moore. For description, see HIST 2420.

RELST 2622 Judaism from the Persian Period to the Rise of Islam (also NES 2622)
Spring. 3 credits. L. Jovanovic. For description, see NES 2622.

RELST 2651 Holy War, Crusade, and Jihad (also COML 2310, HIST 2691, JWST/NES 2651)
Fall. 3 credits. Next offered 2009–2010. R. Brann.]

RELST 2655 Intro to Islamic Civilization (also HIST 2530, NES 2655)
Fall. 3 credits. D. Powers. For description, see NES 2655.

RELST 2665 Daily Life in the Biblical World (also ARKEO/JWST/NES 2662, LA 2520)
Fall. 3 credits. J. Zorn. For description, see NES 2662.

RELST 2724 Introduction to the Hebrew Bible (also NES 2724, JWST 2724)
Fall. 3 credits. L. Jovanovic. For description, see JWST 2724.

RELST 3230 Myth, Ritual, and Symbol (also ANTHR 3420)
Spring. 4 credits. J. Fajans. For description, see ANTHR 3420.

RELST 3260 Christianity and Judaism (also COML 3260)
Spring. 4 credits. C. Carmichael. For description, see COML 3260.

RELST 3351 Indian Religious Worlds (also ASIAN 3351)
Fall. 4 credits. D. Gold. For description, see ASIAN 3351.

RELST 3460 Modernization of the American Mind (also AMST/HIST 3460)
Fall. 4 credits. L. Moore. For description, see HIST 3460.

RELST 3524 Israeelite Prophecy (also NES 3524)
Spring. 4 credits. L. Monroe. For description, see NES 3524.

RELST 3619 Near Eastern Christianities, 50-650 CE (also HIST/JWST/INES 3619)
Fall. 4 credits. K. Haines-Eitzen. For description, see NES 3619.

RELST 3643 Greek and Roman Mystery Cults (also CLASS 3643)
Spring. 4 credits. K. Clinton. For description, see CLASS 3643.

RELST 3651 Law, Society, and Culture in the Middle East (also HIST 3651/6651, NES 3551/6551)
Spring. 4 credits. D. Powers. For description, see NES 3551.

RELST 4260 New Testament Seminar (also COML 4260)
Spring. 4 credits. C. Carmichael. For description, see COML 4260.

RELST 4438 Monks, Texts, and Relics: Transnational Buddhism in Asia (also ASIAN 4438/6638)
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)

RELST 4460 Indian Meditation Texts (also ASIAN 4460) @ # (KCM-AS)
Fall. 4 credits. D. Gold. For description, see ASIAN 4460.

RELST 4462 Religion, Colonialism, and Nationalism (also ASIAN 4462/6662) (CA-AS)
Fall. 4 credits. A. Blackburn. For description, see ASIAN 4462.

RELST 4639 Readings in Arabic Historical Texts (also NES 4639)
Fall. 4 credits. D. Powers. For description, see NES 4639.

RELST 4787 Hellenistic Jewish Literature (also JWST/INES 4787)
Fall. 4 credits. L. Jovanovic. For description, see NES 4787.

RELST 4821 Religious and Secular in American Culture (also AMST/HIST 4821)
Fall. 4 credits. L. Moore. For description, see HIST 4821.

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. Staff. For description, see PHIL 6020.

RELST 6653 Buddhist Narrative Literature (also ASIAN 6653)
Fall. 4 credits. D. Boucher. For description, see ASIAN 6653.

RELST 7533 Gender and Late Antiquity (also CLASS/HIST/INES 7533, FGGS 7530)
Fall. 4 credits. K. Bowles and K. Haines-Eitzen. For description, see CLASS 7533.

Additional courses offered by cooperating departments may also be approved through petition for the major in Religious Studies. For details see the program director, whose name and e-mail address can be found on the Religious Studies web site.
ROMANCE STUDIES


The Department of Romance Studies offers courses in the following areas: Catalan, French, Hispanic, Italian, and Luso-Brazilian literatures; French, Italian, Portuguese, Quechua, 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.

Catalan

[CATAL 1210–1220 Elementary Catalan
1210, fall; 1220, spring. 4 credits each semester. 1210 must be taken before 1220. Recommended: knowledge of another Romance language. Next offered 2009–2010. Staff.

Catalan is a Romance language spoken by some 10 million people in four European states (Andorra, France, Italy, and Spain). This course provides a thorough grounding in all language skills: speaking, listening, reading, and writing, and is designed to provide students with the basis for establishing linguistic contact with Catalan culture.]

French


The Major

The major in French is divided into two options: French cultural studies and French literature. While prospective majors should try to plan their programs as far ahead as possible, especially if they intend to study abroad, no students will be refused admission to the major merely because of a late start. See the director of undergraduate studies. This consultation is especially important for finding out what sequence of courses will follow the current choice of courses.

We are currently not admitting students to the French linguistic major. Students having such interests should apply for admission through the field of linguistics. Courses in general linguistics are offered.

French Literature

This option is designed to give students mastery of the oral and written language, as well as knowledge and understanding of French and Francophone literatures and cultures, and to develop their skills in literary analysis.

To be admitted to the major, a student should have completed FREN 2190 and 2210 or equivalent courses (to be determined by the director of undergraduate studies).

To complete the major, a student must:

1. Acquire advanced knowledge of and competence in French language. This competence is demonstrated by the successful completion of FREN 3010, Advanced French I; or FREN 3050, French through Film (only one course may be taken for credit) or a properly accredited study abroad program or the passing of a special language test (the CASE examination) or permission of the director of undergraduate studies.

2. Take the core two courses for the major: FREN 3210, Readings in Modern French Literature and Culture; FREN 3220, Readings in Early Modern French Literature and Culture.

3. Take five or more additional courses in French literature or culture at the level of FREN 3150 or above that cover the following requirements.
   • One course on Francophone Literature or culture
   • One course on French Literature or culture pre-1789
   • One course at the 4000 level
   • Three courses conducted in French (i.e., no more than two courses conducted in English may be counted toward the major)
   • Up to two courses offered by a department other than Romance Studies (for example Comparative Literature, History, Linguistics, Philosophy, Art History, or Visual Studies), provided the course includes a significant (at least 50 percent) French component.

2. Students must receive at least a B– in a course in order for that course to count for the major

3. *Note that one course may fulfill several of these requirements. For example, a 4000-level course on pre-1789 literature or culture will fulfill those two requirements.

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 courses in 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 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 clh2@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’Études 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 an academic opportunity, as 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 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 410–480, FREN 1210. J. Luks (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, and 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 1220: FREN 2060 or 2090. Fall: K. Proux-Garcia (course coordinator) and staff; spring: K. Proux-Garcia.

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 1250, 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 1220, 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. Fall: C. Sparfel (course coordinator), C. Waldron, and staff; spring: 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. Prerequisite: 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 a series of listening and pronunciation exercises. The exercises target vowels, consonants and basic intonational patterns. Expressive intonation will 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). Recommended courses after FREN 2190: FREN 2210, 3010, or 3050. Fall: S. LoBello (course coordinator) and staff; spring: 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 Introduction to Textual Analysis (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: M. C. Vallois and staff; spring: 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)

The French Experience is inevitably a misleading title: as if there were only one experience to speak of, and only one France: as if we could say with any precision what these are and why they might matter. This course intends to give students a chance to see that France has meant many different things to many different folks over time. From the Middle Ages to modernity, we’ll take a look at a handful of texts—literary, historical, philosophical—that have wrestled with issues of identity and community. In the process, we’ll have a chance to engage with what, if anything, France might mean for us now. Readings could include the romances of Chrétien de Troyes, the histories of Renaissance heretics and witches, the scandals and seductions of early modern aristocrats, ongoing debates surrounding philosophy and sovereignty, and various modern accounts—in print and on film—of love, language, and citizenship. We’ll give priority to texts and voices that challenge customary notions of Frenchness (white, male, Parisian, post-Enlightenment) as well as meditation upon the afterlife of those notions in the American imaginary (e.g., David Sedaris, Le Divorce).
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 3100 is required for the major. C. Waldron.

This 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 exercice de style, and theme. Additional exercises will target vocabulary development. Seminar-style participation in class discussions is expected, as are oral 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 3130 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)
Spring. 4 credits. Satisfies Option 1 of language requirement. Prerequisites: FREN 2210, 3120, or 3050, or CASE Q++. Conducted in French. C. Waldron.

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 3220 Readings in Early Modern French Literature and Culture (LA-AS)
Fall. 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 3230 Contemporary French Thought (CA-AS)
Fall. 4 credits. Satisfies Option 1 of language requirement. Prerequisite: FREN 2210, 3010 or 3050 or CASE Q++ placement. Conducted in French. R. Klein.

Survey of the major contemporary poststructuralist, psychoanalytic, and deconstructive theorists in French thought today: Lacan, Foucault, Derrida, Barthes, Bourdieu, Baudrillard and Wittig. Particular emphasis is on the contribution of these theorists to the analysis of sexuality and pedagogy.

FREN 3390 The Haitian Experience
Spring. 4 credits. Satisfies Option 1 of language requirement. Prerequisite: FREN 2210, 3010 or 3050 or CASE Q++ placement. Conducted in French. Staff.

This course will present some of the major features of Haitian society, culture, religion, politics, and literature, from the end of the 18th century to the present. Topics will include: Toussaint L'Ouverture and the Haitian Revolution, the 1790's, voodoo, theories of race and Creole as a language. Works studied will include books and films from and about Haiti. An important part of the course will be devoted to the rich and well-known body of 19th-century Haitian literature (such as Delorme, Durand, Firmin).

FREN 3530 Monsters A–X (Aristotle–X–files) (also COML/FGSS 3530) (CA-AS)
Spring. 4 credits. Conducted in English.

This course will explore the classical, medieval, and early modern sources for our notions of monsters, including strange beasts, wild men, demons, witches, and cyborgs. What do these figures tell us about our idea of what constitutes life? Texts to be considered will constitute life? Texts to be considered will include Aristotle, On the Generation of Animals, Pliny's Natural History, Victor Hugo's Notre Dame de Paris, Gaston Leroux's Phantom of the Opera, Ambrose Paré's On Monsters and Marvels, Beowulf, Bram Stoker's Dracula, and key episodes of the X-Files ("Detour," "Bad Blood," "El Mundo Gira," etc.) as well as critical material from Donna Haraway (Simians, Cyborgs, and Women and Primate Visions), Judith Butler (Gender Trouble), and Julia Kristeva (Powers of Horror).

FREN 3740 Being Bad in the Renaissance (LA-AS)
Fall. 4 credits. Satisfies Option 1 of language requirement. Prerequisite: FREN 3210, 3220, or permission of instructor. Conducted in French. K. Long.

We will follow the tradition of the histoires tragiques, short stories that serve as sources for a number of Shakespeare's plays (Hamlet, Romeo and Juliet, Macbeth, among others) and that foregrounded bad behavior—murder, sexual transgressions, power struggles, and general mayhem. In our analysis of the Heptameron of Marguerite de Navarre, and the histoires tragiques of Matteo Bandello, Pierre Bousiau, and Francois de Belleforest, we will also consider the hold that these bleak views of human nature had on the early modern imagination, and ponder the nature of evil in the early modern universe. All texts will be in French; the course will be conducted in French.

FREN 3970 Existentialism (CA-AS)
Fall. 4 credits. Satisfies Option 1 of language requirement. Prerequisite: FREN 2210, 3010 or 3050, or CASE Q++ placement, or permission of instructor. Conducted in French. R. Klein.

This course will examine the relevance of existentialist authors such as Camus, Sartre, de Beauvoir, Fanon, and Foucault's earliest writings. We will consider the contribution of existentialists to the various theoretical projects of trauma studies, as well as film noir. We will also consider the diverse genres of existentialism: philosophical essay, novel, short story, play.

FREN 4190–4200 Special Topics in French Literature
Fall, winter, spring. 2–4 credits each semester. Prerequisite: permission of instructor. Staff.

Guided independent study of special topics.

FREN 4290–4300 Honors Work in French
Fall, winter, spring. 3000, 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.

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 4470 Old French: Theory and Practice (LA-AS)
Fall. 4 credits. Prerequisite: FREN 2210, 3010, or 3050, or CASE Q++, or permission of instructor. Some knowledge of modern French. C. Howie.

This course has a double mission: to serve as an introduction to the vernacular literature of medieval France for students with little or no familiarity with more archaic forms of French: and to raise a series of questions with which—questions we might even call “theoretical” or “philosophical”—about what it means to deal with the past, and what kinds of languages and desires emerge in medieval texts and in the medievalists who work with them. Readings in all the major medieval genres—lyric, romance, epic, hagiography, lai—and in modern accounts of history, philology, and
Many scholars have examined the cultural and literary production of the period traditionally described as “The Age of Enlightenment” to question or demonstrate its influence on the event/texts/culture of the French Revolution and the birth of our modern democracy. The course will revisit in detail some specific and problematic texts (literary and others) of the age to question the pertinence and legitimacy of such claims in the 21st century. In so doing the course will scrutinize the “rehearsal” of the basic concepts/categories of “democracy,” public/private, and sexual difference, that we usually take as being the center of our modernity.

**FREN 4540 Montaigne and Skepticism (CA-AS)**
Spring. 4 credits. Prerequisite: FREN 2210, 3010, or 3050, or CASE Q++, or permission of instructor. Conducted in French. K. Long.

The Wars of Religion in France and throughout Europe offer the context of continual violence, trauma, and social upheaval, and the Essais of Michel de Montaigne respond to this context by elaborating a new form of skepticism, based on classical models, which creates a space for more humane ethics (including some of the earliest discussions of religious and racial tolerance) and for freedom of thought (a relatively new concept in the Western World), by means of radical questioning of the functioning of political, religious, and intellectual authority. What Montaigne offers is both a practical and intellectual model for coping with extreme and omnipresent violence and social conflict, a model that presents difference as a necessary condition of physical and psychic survival. We will read the Journal de Voyage as well as the Essais. All texts will be in French.

**FREN 4700 Contemporary Readings of Ancients (also HIST 4700)**
Fall. 4 credits. D. Rubenstein.

For description, see HIST 4700.

**FREN 4760 Libertine Literature (also COML 4760, COML 6781, FREN 6780)**
Spring. 4 credits. Conducted in English. T. McNulty.

In France, the emergence of libertine literature as a distinct genre coincides with political and philosophical debates about universalism, the rights of man, and equality. What do the first libertine writers have to tell us about the nature of the human subject and its relationship to the law or to the universal? What are their insights into human eroticism, the relation between the sexes, violence and power? How does libertine literature deal with the female subject, and how, if at all, does the genre change in the hands of female authors? These questions will lead to a theoretical examination of the relationship between libertinism and the psychic structure of perversion (sadism, masochism, fetishism), understood as a contestation of the law or signifier and its castrating effects. Works by Sade, Mirabeau, Casanova, Sacher-Masoch, Rachilde, Lautréamont, Réage, and Bataille will be read alongside critical texts by Freud, Lacan, Deleuze, Barthes, André Bersani, and others. We will also examine a few films, including Pasolini’s “Salo: The 120 Days of Sodom,” Kirby Dick’s “Sick: The Life and Death of Bob Flanagan, Supermasochist,” and Michael Haneke’s “The Piano Teacher.” Texts available in French and in English; discussion in English, with optional discussion session in French.

**FREN 6210 Sexuality and Power in the 17th-Century Drama: Corneille, Racine, Molière (also FGSS 6210)**
Fall. 4 credits. M. Greenberg.

This course will examine the politics of representation in Absolutist France. What is the relation between political ideology and sexual politics? And how was this relation both affirmed and undermined on the 17th-century stage?

**FREN 6300 French Reading for Graduates**
Spring. 3 credits. Prerequisite: graduate standing.

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 6350 Postcolonial Poetry and the Poetics of Relation (also COML 4290/6350, FREN 4350, SPAN 4350/6350)**
Fall. 4 credits. J. Monroe.

For description, see COML 4290.

**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 6500 Rehearsing the Enlightenment in France (also FREN 4500)**
Fall. 4 credits. M. C. Vallois.

For description, see FREN 4500.

**FREN 6970 The City in Ruins**
Fall. 4 credits. Conducted in English. N. Hertz.

As long as there have been cities, people have been fascinated by their destruction. We shall examine that fascination, beginning with the earliest Mesopotamian city–lament poems and concluding with contemporary responses to the ruins of the World Trade Center, of Baghdad (back to Mesopotamia, still lamentable after all these years!), and of the decay of inner-city neighborhoods. Topics will include: medieval iconography of ruins, the Renaissance rediscovery of Rome, 18th-century and Romantic painting and poetry, the combination of forces (urban renewal, urban welfare) that demolished sections of central Paris (1848–1871), and some recent speculative writing on ruins by Benjamin, Derrida, and Sebald.

**Italian**


**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 ITA 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 interests, 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 3500, Italian Writing Workshop);
2. Complete the core series of Italian Studies courses: ITAL 2000, Perspectives in Italian Culture (fall), ITAL 2950, Italian Cinema (spring), 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. Notes: 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 2000, 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 two full academic years 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 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. Students wishing to enroll in the minor must meet the above requirements.

**ITAL 2120–1220 Elementary Italian**

ITAL 1220, fall; ITAL 1230, spring. 4 credits each semester.
Pre-requisite: FOR ITAL 1220, 1210 or 1200 or SAT 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.

**ITAL 1230 Continuing Italian**

Fall or spring. 4 credits. Prerequisite: ITAL 1220, or ITAL 1230 or SAT II 450–580. Fall, staff, spring, K. 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**

Spring or fall. 4 credits. Satisfies Option 1 of language requirement. Prerequisite: ITAL 1230, or LPI 56–64, or SAT II 590–680, or CASE Q. Fall, K. Wittelsbach (course coordinator) and T. Alkire; spring, K. Wittelsbach. 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 2190 Italian Intermediate Composition and Conversation II**

Spring. 4 credits. Satisfies Option 1 of language requirement. Prerequisite: ITAL 2090 or equivalent. K. Wittelsbach.

**ITAL 2200 Family Life in Renaissance Italy # (HA-AS)**

Spring. 3 credits. Conducted in English. J. Najemy.

**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. C. Howie.

This course serves as an introduction to the close reading of, and critical engagement with, a range of sources from various periods of Italian literary and cultural history. In fact, since Italy doesn’t really cohere as a political entity until late in the 19th century, this course could just as easily be called Perspectives in Pre-Italian Culture. The questions of perspective—of who’s looking, what’s being looked at, and what we’re looking through—will haunt our readings from sources as varied as Dante’s Commedia, the Reception history of St. Francis of Assisi, medieval visionary women, Michelangelo's love lyrics, the novel (e.g. Moravia), the short story (e.g. Celati), film, and political philosophy. We’ll pay special attention to the way in which desire, pleasure, excess, and resistance structure the articulation of Italian—or more local, frequently urban—identities, and we’ll attempt to grapple with how, even as we get a kind of perspective on Italy, Italy always looks back at us with questions, desires, and a gaze of its own.

**ITAL 2950 The Cinematic Eye of Italy (CA-AS)**

Spring. 3 credits. Satisfies Option 1 of language requirement. Prerequisite: ITAL 2090 or permission of instructor.

Conducted in Italian. T. Campbell. An introduction to Italian cinema from the 1940s to today. Students will view 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 socio-political 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, 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 2000 or permission of instructor.

Conducted in Italian. Staff. 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**

Fall or 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.
narrative—are forged between the city and its urban space? What relationships—geographic, inclusions, and exclusions shape a given space, what limits are at work in defining it boundaries delineate the city as a political formation. Our readings will address the decadence, fascist power and resistance, racial struggle, bourgeois rationality, aristocratic will include novels, films and short stories that 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 3500 The Italian Renaissance (also HIST 3290) (HA-AS)
Fall. 4 credits. Conducted in English. J. Najemy.

ITAL 3690 The History of Florence in the Time of the Republic, 1250–1530 (also HIST 3690) (HA-AS)
Spring. 4 credits. Conducted in English. J. Najemy.

ITAL 3890 Modern Italian Novel (also ITAL 6890) (LA-AS)
Fall. 4 credits. Satisfies Option 1 of language requirement. Prerequisite: permission of instructor. Students who have taken ITAL 3890 previously may retake the course for credit, provided that the readings are different. Conducted in Italian. R. Welch.

Topic for Fall 2008: 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

ITAL 4050 Dangerous Bodies: Mothers, Criminals, Prostitutes, Peasants and (Re)production of Italians (also ITAL 4050)
Spring. 4 credits. Conducted in Italian. R. Welch.

In this course, we will trace a genealogy of the concept of a biological population of Italians through a selection of scientific, political and literary texts of the 19th and 20th centuries. The course is also intended as an introduction to the development of the Italian social sciences during the second half of the 19th century. To begin, we will consider some fundamental texts of 19th-century sociology and anthropology (Franchetti, Lombroso, Mantegazza). In particular, we will ask the following questions: what are the primary objects of inquiry in these texts participate, or not, in the biologization of these objects? What kinds of geographies, both corporeal and terrestrial, are at work and what does this tell us about the project of making Italians? Keeping in mind the 19th-century development of the biological population, we will turn to consider a selection of texts from the nationalist cannon (de Amicis, D’Azezio) in order to examine how they posit a critical relationship between textual and bodily reproduction. The thematic of reproduction re-emerges in the racist texts of the fascist period (Interlandi, Mussolini), which attempt to articulate with scientific precision the existence of an Italian population. After a brief consideration of some of these documents, we will turn to examine of how textual bodies (mothers, criminals, prostitutes and peasants) emerge in literature and cinema, outlets of the post-World War II era to the present. We will pause to consider in particular relevant thematics such as: memories of fascist violence and resistance, the mafia, the urban and rural under-classes, and extra-European immigration to Italy.

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 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 4500 Renaissance Poetry (also COML 4500/6500, ITAL 4500) (LA-AS)
Fall. 4 credits. Conducted in English. W. J. Kennedy.

ITAL 4680 Love and Sex in the Italian Renaissance (also HIST 4680) (HA-AS)
Fall. 4 credits. Conducted in English. J. Najemy.

ITAL 6050 Dangerous Bodies: Mothers, Criminals, Prostitutes, Peasants, and (Re)production of Italians (also ITAL 4050)
Spring. 4 credits. Conducted in Italian. W. J. Kennedy.

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 6500 Renaissance Poetry (also COML 4500/6500, ITAL 4500) (LA-AS)
Fall. 4 credits. Conducted in English. W. J. Kennedy.

ITAL 6750 Thinking Life: Biopolitics and Contemporary Italian Thought
Spring. 4 credits. Conducted in English. T. Campbell.

In much recent philosophical work originating in Italy, no term is more spoken about or theorized than biopolitics. Whether it be Giorgio Agamben’s negative biopolitics in works like The Open, Hardt and Negri’s positively euphoric version of biopolitics in Multitude, Paolo Virno’s own biopolitical grammar set forth in the 1990s, or more recently Roberto Esposito’s affirmative, anti-idolatrous biopolitics in Bosis and Third Person, the biopolitical is at the center of some of the most important interventions in political philosophy being done today. This seminar offers students the chance to become more acquainted with the different strands of contemporary biopolitical thought by offering a genealogical mapping of the term through its various political and philosophical manifestations. Beginning with Hannah Arendt’s interpretation of bios politics, continuing through Michel Foucault’s crucial seminars (‘Society Must be Defended’ and the soon to be published English translation of The Birth of Biopolitics), we will be reading what amounts to a canon of the biopolitical. Readings will include Agamben’s The Coming Community, Homo Sacer, and The Open, Hardt and Negri’s Empire and Multitude, Esposito’s Communities and Bosis, as well as the important interventions of Paul Virno and Maurizio Lazzarato. We’ll also be devoting significant space to other non-Italian encounters with the biopolitical (Stoler, Mbembe, Montag, Sloterdijk). Questions to be discussed include: the relation of the biopolitical to the imperial; idolatry and the dispositif of the person in post-Marxist thought; the biopolitics of neo-liberalism; modern immunities and the community; thanatopolitics as the ground for an affirmative biopolitics; and necro-power and necro-economics. All readings are available in English.
PORT 4190–4200 Special Topics in Brazilian Literature
4190, fall; 4200, spring. 2–4 credits.
Prerequisite: permission of instructor.
Guided independent study of specific topics.
For undergraduates interested in special problems not covered in courses.
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 2250 (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 Andalucía. 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 Penn. Latin American and 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.ciaoabroad.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 courses on 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 Ocal, 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 on 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 1210 Elementary Spanish I
Fall or spring. 4 credits. Prerequisite: SPAN 1210, or LPS 37–44, or SAT II 470–550. Class meets five times a week: four class sessions and one lecture. T. Beviá 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 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
Fall or spring. 4 credits. Prerequisite: SPAN 1210, or LPS 37–44, or SAT II 470–550. Class meets five times a week: four class sessions and one lecture. T. Beviá 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 short cultural and literary texts to foster vocabulary acquisition 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 SPAN 1220, students may take SPAN 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. Class meets four times a week. Fall, N. Maldonado-Méndez (course coordinator), S. Amigo-Silvestre, L. Morató-Peña, E. Sánchez-Blake, and staff; spring: N. Maldonado-Méndez (course coordinator), L. Morató-Peña, E. Sánchez-Blake, and staff; summer: A. Stratakos-Tió.

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 while 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 1250, LPS 56–64, or SAT II 590–680, Q. Not open to students who have taken SPAN 2000 or 2090 should speak to an instructor. A. Stratakis-Tiò.

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 1250, or LPS 56–64, or SAT II 590–680, Q. Not open to students who have taken SPAN 2070. Class meets three times a week. J. Routier-Pucci (course coordinator) 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 may 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. J. M. Rodríguez-García and staff.

Introductionary 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 discussions of works of literature 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 2210) (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. L. Hernandez.

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, Dardo, Agustín, Cortázar, García Márquez, Pontiawoska, 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. Staff.

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 subjectivities will be studied. Readings may be drawn from medieval short stories and miracle collections; chivalric romances, Columbus, and literary as well as geographic discovery, Lázaro de Torres, Cervantes, Lope de Vega, Calderón, 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. L. Meza-Riedewald (course coordinator) and staff.

This intermediate-advanced 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 offered every spring through the Latin American Studies Program. Topics vary by semester, but readings always focus on current research in various disciplines 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. Prerequisite: SPAN 219 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 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 concentration 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 2310 Issues of Identity in Contemporary Spain
Fall. 3 credits. O. Bezhanova.

How do the works of art participate in the creation of identities? How do we construct our personal and collective identities through reading and writing? What mechanisms do we use in order to form our national, sexual, gender, linguistic, and other kinds of collective identities? Is there a conflict between our individuality and our collective identification? We will attempt to answer these and other questions by reading works of fiction by prominent Spanish writers as Juan Goytisola, Javier Marías, Antonio Muñoz Molina, Adelaida García Morales, Arturo Pérez Reverte, Eduardo Mendoza, and Julio Llamazares. Also, we will watch and discuss films by Vicente Aranda, Héctor Carré, Fernando León de Aranaú, and Alejandro Amenábar.

SPAN 2320 Intellectuals and Ideologues: History of Ideas in the Twentieth-Century Spain
Spring. 3 credits. Conducted in English. O. Bezhanova.

Do ideas matter? How can intellectuals contribute to molding reality? What is ideology? Who participates in this creation? In this course, we will study some of the central issues that have been discussed by intellectuals in Spain in the 20th century. We will attempt to discover what rhetorical strategies and narrative means they used to order to disseminate their ideas. Readings include essays by Unamuno, Ortega y Gasset, Américo Castro, Juan Goytisolo, Carmen Martín Gaite, María Zambrano, Javier Marías, and others. These essays raise a wide range of issues that have not lost their relevance until today.

SPAN 3010 Hispanic Theatre Production (also LATA 3010)
Fall or spring. 1–5 credits, variable. 3 credits satisfies Option 1 of language requirement and fulfills (LA-AS). D. Castillo and E. Sánchez-Blake.

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 conversation 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 (course coordinator) 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 3130 Spanish Writing Workshop for Advanced English/Spanish Bilinguals (LSP 3130)
Spring. 1 credit. Prerequisite: permission of instructor; N. Maldonado-Méndez and staff. Designed for the advanced bilingual seeking support in the development of written accuracy, this workshop can serve as a complement for a literature or culture course conducted in Spanish. Meets one hour per week, concurrently with one of the weekly sessions of SPAN 2000. Students enrolled in this course are expected to work autonomously, to keep up with the syllabus of SPAN 2000, and to come to class with focused questions drawn from writing tasks either assigned from other courses, or prepared as self-assigned exercises. The workshop will be conducted in a peer-editing format. The final exam will consist of preparing a term paper in Spanish that demonstrates progress achieved in written accuracy. Students who have taken other Spanish language courses in the department including SPAN 2000, and who have difficulties with writing identified as specific to the English/Spanish bilingual, are eligible to enroll and may receive credit SPAN 5130 with the instructor’s permission. Course may be repeated for credit.

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/ending, 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 3180 Reading the Novel in Spain
Fall. 4 credits. Satisfies option I of language requirement. Prerequisite: SPAN 2140, 2150, 2170, or 2190, or CASE Q++, or permission of instructor. Conducted in Spanish. O. Bezhanova. The 19th century in Spain witnessed an explosion in the novelistic production. In Spain, the realist and the naturalist novel enjoyed an incomparable degree of popularity. This course examines the novels by some of the leading writers of the 19th-century Spain, such as Benito Pérez Galdós, Pedro Antonio de Alarcón, José María de Pereda, Emilia Pardo Bazán, Armando Palacio Valdés, and Leopoldo Alas. We will explore the narrative strategies and the thematic preoccupation that have ensured our continued interest in the literature of the 19th century.

SPAN 3600 Autobiographical Narrative and the Cuban Socialist Revolution
Fall. 4 credits. Satisfies option I 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, this course will consider 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 discourse in the novel “Antes que anochezca”; 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 Communism 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 3790 Africanist Modernism: Negrismo and Négritude (also FREN 3790)
Spring. 4 credits. Conducted in English. G. Aching.
This course is a comparative study of texts for the French and Spanish speaking Caribbean from the 1920s to 40s (Aime and Suzanne Césaire, Lydia Cabrera, Wilfredo Lam, Alejo Carpentier, and others). Students should have good reading knowledge of Spanish and French.

SPAN 3800 Poetry and Poetics of the Americas (also AMST 3820, COML 3800)
Spring. 4 credits. J. Monroe. For description, see COML 3800.

SPAN 3940 Spanish Cinema: The Sinister, The Satirical, and The Scandalous
Spring. 4 credits. Satisfies option I of language requirement. Prerequisite: SPAN 2140, 2150, 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 some works that argue to be Spain’s three greatest directors of all time—the three “Bs” (Luis Buñuel, Juan Antonio Brademik, and Luis García Berlanga)—we will also examine films by Carlos Saura, Basilio Martín Patino, Vincente 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, and 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 4130 Classics of Latino/a Literature (also LASP 4130) (LA-AS)
Fall. 4 credits. Prerequisite: SPAN 2140, 2150, 2170, or 2190, or CASE Q++, or permission of instructor. Conducted in Spanish. D. Castillo. What makes a book a “classic”? When does it become a “must-read”? What do we mean when we talk about Latino/a literary canon? This course looks at foundational texts of U S latitud, in Spanish and in English, from colonial times to the present, in all the major literary genres (novel, short story, drama, film, essay, poetry). Readings are likely to range from Cabeza de Vaca’s chronicles, to José Marti’s newspaper articles on late 19th century New York, to the mid 20th century “Chicana Big Three” (Rivera, Anaya, Hinojosa), to contemporary poetry (Cervantes, Cisneros), to Pulitzer Prize winners like Cruz and Hijuuelos.

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 4350 Postcolonial Poetry and the Poetics of Relations (also COML 4290/6350, FREN 4350/6350, SPAN 6350) (LA-AS)
Fall. 4 credits. J. Monroe. For description, see COML 4290.
SPAN 4550  Don Quijote (also SPAN 6530) # (LA-AS)
Spring. 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. García. 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 medieval 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 4590 Spanish Bildungsroman of the 20th Century (LA-AS)
Spring. 4 credits. Conducted in Spanish. O. Bezhanova. For several decades, the scholars of literature have been pointing out that the genre of Bildungsroman has lost its relevance and will soon cease to exist. However, the number of Bildungsromane that appear in print and end up on bestseller lists keeps growing. In this course, we will explore Spanish Bildungsromane by Concha Espina, Carmen Laforet, Luis Martín-Santos, Espido Freire, Care Santos, José Angel Maños, Susana Fortes, Lucía Esteban and Ray Loriga. We will see how the genre has transformed in the course of the 20th century in order to adapt to the changing reality of the world. We will also explore the relationships between the male and the female Bildungsroman in Spain.

SPAN 4670 Modern Lyric Forms (CA-AS)
Fall. 4 credits. This is the mandatory senior seminar for Spanish majors. 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—“vosos”—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 Bueno Vallejo that fictionalize the lives of the great Spanish painters Velázquez and Goya.

SPAN 4730 Narrative of Abandonment and Return in 20th Century Spain (CA-AS)
Fall. 4 credits. Conducted in Spanish. P. Keller. This course offers a multi-genre reflection of contemporary Spanish history and culture by exploring texts centered on the themes of trauma and memory. The main aim of the class will be to think about representations of collective and individual experiences of loss in recent Spanish history (the Civil War, dictatorship and post-dictatorship eras) through a literary/visual lens. Some of the topics for discussion will include exile, homecoming, nostalgia, mourning, failure, and hope. We will also discuss the idea of landscape as it relates to struggle for loss and recovery, specifically examining texts that depict wounded or scarred spaces, uninhabitable homes, abandoned towns, ghostly landscapes, and desolate cities. As such, an additional focus of the course will be to consider how trauma and memory, as underlying features of modern Spanish experience, 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 various canonical and non-canonical works dating from the 1930s to the present. Among the artists we will look at are Dalí, Bultel, García Lorca, Cela, Llamazares, Erice, Martínez de Pisón, Saura, Suso de Toro, and Fontcuberta. Additional readings in theory and criticism will be assigned to complement primary texts.

SPAN 4800 The Return of the Real: New Realisms in Latin American Narrative (LA-AS)
Spring. 4 credits. Prerequisite: SPAN 2140, 2150, and 2170, or permission of instructor. This is the mandatory senior seminar for Spanish majors. Conducted in Spanish. L. Horne. This course engages in an in-depth study of realism in recent narrative and film from Latin America. We will explore the main conceptual problems of this aesthetic current and its particularities in the context of contemporary Latin American culture. Among the topics dealt with are: the treatment of traditional realist themes—such as sex, poverty and violence—in a new context; the place of humor and the oniric in the new realisms; the problem of representation in image culture and written culture; exposed corporealties, ugliness and aesthetic pleasure; consumerism, globalization, and violence; different ways of including marginal subjectivities in the work of art. This course will provide students with theoretical concepts and vocabulary to better understand some of the principal cultural debates in contemporary Latin America. Authors to be read include César Aara, Mario Bellatin, Rafael Courtois, Pedro Juan Gutiérrez and Fernando Vallejo.

SPAN 4820 Spanish-American Detective Fiction
Spring. 4 credits. E. Paz-Soldán. Originally an exotic translated import from the Anglo-Saxon tradition, mystery fiction flourished in Spanish America in the 20th century, albeit on slightly different terms. The course surveys detective stories and novels—in the rational, hard-boiled, and parodic modes—by such leading authors as Borges, Puig, Fuentes, and Vargas Llosa, as well as by young authors like Leonardo Padura and Patricia Melo.

SPAN 6250 American Originals
Spring. 4 credits. This is the mandatory seminar for graduate students in Hispanic Literature. Conducted in Spanish. J. M. Rodriquez. Through the comparative study of some of the most influential and acclaimed modernist poets of the twentieth century, this course will explore such tensions as cosmopolitanism/autchtony, innovation/tradition, modernization/primitivism, translation/originality, religion/secularism and revolution/reconciliation. Other focal points include authors’ conflicted desires to craft unique, fragmentariness and totality, and for the culturalist and vernacular registers of the language. The general questions of the poet and the city and the social and political responsibility of art will also receive consideration attention.

SPAN 6350 Postcolonial Poetry and the Poetics of Relation (also COML 4290/6350, FREN 4350/6350, SPAN 4350)
Fall. 4 credits. J. Monroe. For description, see COML 4290.

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 6530 Don Quijote (also SPAN 4550)
Spring. 4 credits. M. A. García. For description, see SPAN 4550.

SPAN 6590 New Latin American Canon
Fall. 4 credits. This is the mandatory seminar for graduate students in Hispanic literature. Conducted in Spanish. E. Paz-Soldán. In the last years there has been a critical discussion about the idea of the “canon” in a given literature. The aim of this course is twofold: on one hand, to discuss whether the concept of “canon”—a corpus of significant texts in a literary tradition—is still relevant for critical discourse, and, if so, what constitutes it today, and who makes it; on the other hand, to analyze, in the specific case of Latin American literature, some contemporary works and authors whose centrality/marginality in the “canon” has changed in recent years. Some of the writers to be discussed are: Clarice Lispector, Sergio Pitol, Fernando Vallejo, César Aara, Ricardo Piglia, Carmen Boullosa, Horacio Castellanos Moya, Roberto Bolano, Antonio José Ponte, and Mario Bellatin.

RUSSIAN


For updated information, consult our website:
(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:**
   1. Any Russian-language (RUSSA) course totaling 3 or 4 credits at the 2000 level or
      above (with the exception of RUSSA 3500 Directed Study) satisfies the Arts and
      Sciences language requirement under Option 1a.
   1. After completing the prerequisites RUSSA 1121 and RUSSA 1122, students may
      satisfy the language requirement by taking RUSSA 2209. Students who qualify for
      RUSSA 2212 may satisfy the language requirement by taking that course. Other RUSSA
      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, 1104 in the 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 for full year. Further information is available from
Professor Waynes Browne in the Department of Linguistics (220 Morrill Hall) and from the Cornell
Abroad Office.

**Honors.** Students taking honors in Russian do individual research and writing 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 non-intensive: 1121 in the fall, 1122 in the spring.**
- **Second-year intensive: 1125 + 2203 in the fall, 1126 + 2204 in the spring.**
- **Second-year non-intensive: 2203 in the fall, 2204 in the spring.**
- **Second-year mostly reading; lighter load:** 1125 in the fall, 1126 in the spring.

#### RUSSA courses

**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 (e.g., speaking, reading and
  writing). Course materials include clips from original Russian films and TV 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 instructor.* See starred (*) note at end of RUSSA
section. Course may be cancelled if enrollment is insufficient. 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 2205, 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. See starred (*) note at end of RUSSA section.

**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. Satisfies Option 1.
  Prerequisite: for RUSSA 3305, RUSSA 2204 or equivalent; for RUSSA 2205, RUSSA
  3305 or equivalent. R. Krivitsky, S. Paperno, and V. Tsimberov.
- Reading, writing, and conversation: current Russian films (feature and documentary),
  newspapers, TV programs, Russian websites, 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 (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 3505 or 3306 for heritage speakers of Russian; for all others with
  advanced knowledge of Russian, placement by department. Not only to
  fluent native speakers of Russian (recommended: RUSSA 3309/3310 and
  RUSSA 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 (1970's through the present).
  Course materials include traditional and urban folklore, film, animation, published books
  (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 2200; for RUSSA 3310, RUSSA 3305 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.
RUSSIAN 655

Designated 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)**
For description, see LING 4417–4418.

**RUSSA 4403 Linguistic Structure of Russian (also LING 4443) (KCM-AS)**
Fall. 4 credits. W. Browne.
For description, see LING 4443–4444.

**RUSSA 4413–4414 Advanced Conversation and Stylistics**
4413, fall; 4414, spring. 2 credits each semester. Prerequisite: for RUSSA 4413, RUSSA 3504 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. W. Browne.
For description, see LING 6663.

**RUSSA 6602 Old Russian Texts (also LING 6662)**
Spring. 4 credits. W. Browne.
For description, see LING 6662.

**RUSSA 6633–6634 Russian for Russian Specialists**
6633, fall; 6634, spring. 1–4 credits. variables. 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. 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 day, 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 russiaanddept@cornell.edu.

**For TBA courses taught by Wayles Browne, contact Professor Browne (ewbh2@cornell.edu or 255-0712).**

**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.

**RUSSL 2207–2208 Themes from Russian Culture # (LA-AS)**
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. 5 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 3500–4400 courses with reading in Russian.

**RUSSL 2212 Readings in 20th-Century Russian Literature (LA-AS)**
Fall. 5 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 3500–4400 courses with reading in Russian.

**RUSSL 2279 The Russian Connection, 1820 to 1867 (also COML 2790) # (LA-AS)**
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 2900) (LA-AS)**
Examines the Dostoevskian novel against background of European prose (Diderot, Camus, Sarratea, et al.).

**RUSSL 3311 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. S. Senderovich.
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 3329) # (LA-AS)**
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)**
Fall. 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. P. Carden.
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)**
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)**
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)**
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. P. Carden.
Fundamental issues of education explored through great works: 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). N. Pollak.
The rise of the Russian novel in the 19th century: Pushkin, Lermontov, Turgenev, Dostoevsky, Tolstoy, Chekhov.

[RUSSL 3369 Dostoevsky # (LA-AS)]
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)]
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)
Fall, 4 credits. In translation. Limited to 18 students; priority given to seniors. G. Shapiro.
Offers an exciting trip into the intricate world of Nabokovian fiction. After establishing himself in Europe as a distinguished Russian writer at the outbreak of World War II, Nabokov came to the United States, where he re-established himself as an American writer of world renown. In our analysis of the Nabokovian artistic universe, we focus on his Russian corpus of works, from Mary (1926) to The Enchanter (writ. 1939), and examine the two very widely read novels that he wrote in Ithaca while teaching literature at Cornell, Lolita (1955) and Pnin (1957).

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)]
Practical workshop in translation: documents, scholarly papers, literary works (prose and poetry). Mosdly Russian to English, some English to Russian.

[RUSSL 4432 Pushkin # (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 2010–2011. 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 2010–2011. P. Carden.
A selection of short stories and short novels in Russian. Attention to style, themes, idioms. Assignments adjusted to students’ language capabilities.

[RUSSL 4437 A Moralist and a Pornographer (also COML 4370) (LA-AS)]
Bestsellers Doctor Zhivago and Lolita (both October 1958) concerned the sexual exploitation of a teenage girl.

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 2009–2010. S. Senderovich.
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)]
4 credits. Reading in Russian; discussion in English. Prerequisite: proficiency in Russian or permission of instructor. Next offered 2009–2010. 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

Czech

CZECH 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.

Hungarian

[HUNGR 1131–1132 Elementary Hungarian]
3 credits. Prerequisite: for 1132; HUNGR 1131 or permission of instructor. This language series (1131–1132) is not sufficient to satisfy the language requirement. Next offered 2009–2010. 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 1135 or permission of instructor. 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)
Fall.
For description, see LING 4427.

Polish

POLSH 1131–1132 Elementary Polish
1131, fall; 1132, spring, 3 credits each semester. Prerequisite: for POLISH 1132, POLISH 1131 or equivalent. This language series (1131–1132) is not sufficient to satisfy the language requirement. Offered alternate years. Staff.
Covers all language skills: speaking, listening comprehension, reading, and writing.
**POLISH 1133–1134 Continuing Polish**

1133, fall; 1134, spring. 3 credits each semester. Prerequisites: for POLISH 1133, POLISH 1132 or permission of instructor; for POLISH 1134, POLISH 1133 or equivalent. Times TBA with instructor. **Offered alternate years; next offered 2009–2010. See double-starred (**) note at end of UKRAN section. W. Browne. An intermediate conversation and reading course.**

**POLISH 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.

**POLISH 3301 Polish through Film and Literature**

Spring. 3 credits. Satisfies Option 1. Prerequisite: POLISH 1134 or permission of instructor. Times TBA with instructor. **See double-starred (**) note at end of UKRAN section. C. Golkowski. Language proficiency and insight into Polish culture through videos, films, and contemporary texts. Listening and reading comprehension, conversation, grammar review.**

**SEBCR 1131–1132 Elementary Serbo-Croatian**

1131, fall; 1132, spring. 3 credits each semester. Prerequisite for SEBCR 1132: SEBCR 1131 or equivalent. This language series (1131–1132) is not sufficient to satisfy language requirement. Times TBA with instructor. **Offered alternate years; next offered 2009–2010. See double-starred (**) note at end of UKRAN section. W. Browne. 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 1134: SEBCR 1132 or equivalent; for SEBCR 1134: SEBCR 1133 or equivalent. Times TBA with instructor. **See double-starred (**) note at end of UKRAN section. W. Browne. 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 2009–2010. 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**

Fall or 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 Professor Browne (ewb2@cornell.edu or 255-0712) for time and place of organizational meeting(s).**

**SANSKRIT**

See “Asian Studies.”

**SCIENCE AND TECHNOLOGY STUDIES**


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 (ST&S) addresses such issues through the study of the social aspects of knowledge, especially scientific and technological knowledge. ST&S explores the practices that shape science and technology, examines their social and cultural context, and analyzes their political and ethical implications. ST&S 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. Students in the Classes of 2009, and 2010 may choose to meet the old requirements or opt for the revised version, which is described here. Information and worksheets for the old requirements are available in the departmental office, 306 Rockefeller Hall (255-6047). Admission to the major requires successful completion of one ST&S course. First-Year Writing Seminars may count as the prerequisite, 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 ST&S 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

ST&S 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 ST&S 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 ST&S 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. ST&S majors are considered for entry into the honors program at the end of the second semester of their junior year. To qualify for the ST&S honors program, students must have an overall Cornell cumulative grade point average (GPA) of at least 3.00 and a 3.50 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 ST&S department. More information on the honors program is available from the ST&S 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. 487 of this catalog.

The Minor in Science and Technology Studies

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

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. 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. S. Seth. 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. T. Pinch. Introduces some of the central ideas in the field of Science and Technology Studies (S&T). 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. Next offered 2009–2010. 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. P. Dear. For description, see HIST 2810.

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. P. Dear. For description, see HIST 2820.

STS 2851 Communication in the Life Sciences (also COMM 2850)
Spring. 3 credits. Staff. For description, see COMM 2850.

STS 2861 Science and Human Nature (also PHIL 2861) (KCM-AS)
Spring. 4 credits. R. Boyd. For description, see PHIL 2861.

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. J. Crane. For description, see BSOC 3011.

STS 3111 Sociology of Medicine (also SOC 3130) (SBA-AS)
Spring. 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 practice with special emphases 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 3221 Lives of Scientists and Engineers (also FGSS 3221) Spring. 4 credits. M. Rosseter. 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 BSOC/SOC 3240) (SBA-AS) Fall and spring. 3 credits. Fall: C. Geisler; spring: G. Gillespie. For description, see DSOIC 3240.

STS 3301 Physical Sciences in the Modern Age (also HIST 3290) (HA-AS) Spring. 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 electrodynamics, the quantum and relativity theories, and the role of the worlds 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, Helmholz, 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. S. Wolf. For description, see NTRES 3310.

STS 3431 Biotechnology and the Economy (also BSOC 3431) Fall. 4 credits. Next offered 2009–2010. J. Reppy. In the 30 years since Genetech was founded to exploit recombinant DNA technologies, the biotechnology industry has grown to be a multi-billion dollar industry, employing perhaps 800,000 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 scientific discipline 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 3491 Media Technologies (also COMM 3490, INFO 3491) (HA-AS) Spring. 3 credits. Offered odd-numbered years. T. Gillespie. For description, see COMM 3490.

STS 3521 Science Writing for the Mass Media (also COMM 3520) Fall. 3 credits. B. Lewenstein. Students whose take STS 3521 may not take credit for COMM 2600 or 2630. For description, see COMM 3520.

STS 3541 The Sociology of Contemporary Culture (also BSOC 3541, SOC 3520) (CA-AS) Fall. 4 credits. Next offered 2009–2010. C. Lechner. Introduces students to the rapidly expanding body of work at the intersection of sociology, cultural studies, and science and technology studies. Provides an introduction to theoretical debates in cultural studies and to sociological studies of culture. Discusses the emergence of the tourist industry, the significance of consumption in modern life, the culture of music and art, the use of rhetoric in social life; cultural and feminist analyses of knowledge and science, and the social construction of self, bodies, and identities.

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 computing is presumed or required. STS 3551 and 3561 can be taken separately or in any order. J. Ratcliff. Computers have not always been ubiquitous boxes gracing our desktops: in Victorian London, Charles Babbage tried to build an analytical engine using brass gears and steel rods, and during World War II the Allied governments used sophisticated electro-mechanical and electronic “brains” to break Axis codes. How did computing technology, once useful only to technical specialists, come to colonize industry, academia, the military, and the home? This course explores the history of computing, placing ideas and technologies in both social and historical context; for example, it relates Charles Babbage’s difference engines to the factory system, IBM to the population census, and feedback systems and Turing machines to the demands of war. Looking at the history of the computer teaches something of how technology, society and knowledge depend on and change one another. It also helps students discover something about the relationship between machines and society today. This is a course in the history of computing; a background in computer science is not required.

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 (also ENGRG 3600) Spring. 3 credits. Limited to juniors and seniors only. P. Doring. 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. J. Reppy. 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. Topics include the politics of research funding, the role of scientific expertise in the federal government and in the courts, the impact of secrecy in military science, and citizen participation in science policy.

STS 4001 Components and Systems: Engineering in a Social Context (also MAE 4000/4010) Spring. 3 credits. Offered alternate years. Z. Warhaft. For description, see MAE 4000.

STS 4021 Bodies in Medicine, Science, and Technology (also BSOC/FGSS 4021) Spring. 4 credits. Limited to 15 students. 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: Are 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 technology. 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 improvized, 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 contexts 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 BSO 4071) (SBA-AS)]
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&STS) 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 4091 From the Phonograph to Techno (also SOC 4090) (SBA-AS)]
T. Pichard.
In this seminar, we treat music and sound and the ways they are produced and consumed as sociocultural phenomena. We specifically investigate the way that music and sounds are related to technology; to law and 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 2009–2010.
S. Hilgartner.
Should the human genome be treated like machines: transplant surgeons talk about our “spare parts”; computer programmers describe their brains as “wetware.” Our sense of our bodies may feel improvized, 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 contexts of science, technology, and medicine, as well as how cultural and political concerns express themselves in and through bodies.

[STS 4120 The Scientific Revolution in Early-Moderneurope (also HIST 4120) (HA-AS)]
Spring. 4 credits. P. Dear.
For description see HIST 4120.

[STS 4121 Science, Technology, and Culture (also COML 4100) (CA-AS)]
Fall. 4 credits. Next offered 2009–2010.
A. Banerjee.

[STS 4181 Confluence: Environmental History and Science and Technology Studies (also BSO 4181, HIST/ SHUM 4181) (SBA-AS)]
Fall. 4 credits. S. Pritchard.
For description see SHUM 4811.

[STS 4221 New York Women (also FGSS 4220, HIST 4451) (HA-AS)]
Fall. 4 credits. Limited to 15 students. Next offered 2009–2010.
M. Rossiter.
Over the centuries New York City 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 BSO/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 do vacuum cleaners and vacuums 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 reproduce 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; industrial work; consumption; the domestic sphere; technologies of war; the postwar workplace; sex and sexuality; and reproductive technologies. May 4 course material focuses on Western Europe and the United States since the late eighteenth 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 4241 Medicine, Science, and the Body in Postcolonial Africa (also BSO 4241)]
Spring. 4 credits. J. Crane.
Growing attention to the global AIDS epidemic and the rise of “global health sciences” proceeding in the West has recently made health and medicine in Africa a topic of growing interest in international health. At the same time, inequalities in access to resources and education mean that African researchers often remain at the periphery of scientific knowledge production in global health. This course examines current issues surrounding biomedical practice and research in Africa, paying particular attention to colonial histories, postcolonial power relations, and the role of African clinicians and scientists in shaping health care and medical knowledge.

[STS 4291 Politics of Science (also GOVT 4293) (HA-AS)]
Fall. 4 credits. Next offered 2009–2010.
R. Herring.

[STS 4311 From Surgery to Simulation (also BSO 4311) (SBA-AS)]
R. Prentice.
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 4311 International History of Science (SBA-AS)]
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 4321 Science and Empire: The Case of Britain and India]
J. Ratcliffe.
What is the historical relationship between global politics and science? This is a subject of volatile debate; it raises difficult questions about the perceived superiority of Western systems of knowledge, and it invites the more fundamental question of what is meant by Western science. Within science studies these are long-standing issues, but their scope has recently begun to change as new resources and perspectives from postcolonial regions are brought to the table. This course will examine the current literature on one specific case: the role of science, technology and medicine in the historical development of relations between Britain and India. We will take the long view, covering the medieval era to the present.

[STS 4381 Environments and Waterscapes (also AMST/HIST/SHUM 4813, BSO 4381)]
Fall. 4 credits. A. Sachs.
For description see SHUM 4813.

[STS 4421 The Sociology of Science (also BSO 4421, SOC 4420)]
Spring. 4 credits. 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 and fall. 4 credits. Limited to 18 students. S–U or letter grades. W. Provine and G. Gorman.
For description, see BIOEE 4670.

STS 4531 Knowledge and Society (also SOC 4530) (CA-AS)
Fall. 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 covers various theoretical and empirical approaches that have been influenced by the sociology of knowledge such as ethnemethodology, conversation analysis, and the sociology of science and technology.

STS 4660 Public Communication of Science and Technology (also COMM 4660)
Spring. 3 credits. Limited to 15 students. Staff.
For description, see COMM 4660.

STS 4681 Understanding Innovation (HA-AS)
For description, see HIST 4581.

STS 4711 The Dark Side of Biology: Biological Weapons, Bioterrorism, and Biocriminality (also BSOE 4711) (SBA-AS)
For description, see BSOE 4711.

STS 4751 Science, Race, and Colonialism (also HIST 4640) (CA-AS)
Fall. 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 centers 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 genetic information when researching and prescribing new treatments.

STS 4811 Philosophy of Science (also PHIL 4810, STS 6811) (KCM-AS)
Spring. 4 credits. R. Boyd.
For description, see PHIL 4810.

STS 4831 The Military and New Technology (also GOVT 4837) (SBA-AS)
Fall. 4 credits. J. Reppy.
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. Readings include Steven Rosen, Better the Next War and Williamson Murray and MacGregor Knox, eds., The Dynamics of Military Revolution: 1300–2050.

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, BSOE/HIST 4961) # @ (HA-AS)
Spring. 4 credit. T. Hinrichs.
For description, see HIST 4961.

STS 4991 Undergraduate Independent Study
Fall, spring. 1–4 credits. No more than 8 hours total of independent study (not including honors) can count toward the S&T&S major. Prerequisite: permission of instructor.

STS 4991/4992 Honors Project
Fall and spring (yearlong)*. Prerequisite: senior S&T&S 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&T&S department.

*Students must register for total credits desired for the whole project each semester (e.g., 8 credits for the fall semester and 8 credits for the spring semester). 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.

Graduate Seminars

STS 6271 Making People Through Expert Knowledge
Spring. 4 credits. 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 inquiry. We will also 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
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 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 politics, science, as well as bureaucratic and economic imperatives that shape modern and postmodern conceptions of the self.

[STS 6301 Social Theory Information Fall. 4 credits. Next offered 2010–2011. 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 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, 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 critical and coherent 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. T. Pinch. 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 2009–2010. T. Pinch. Rather than analyze the social impact of technology upon society, this course investigates how society gets inside technology. In other words, it is 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 men and women 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 various technologies, such as the ballistic missile, the bicycle, the electric car, and the refrigerator.]

[STS 6341 Information Technology in Sociocultural Context Fall. 4 credits. Next offered 2009–2010. P. Sengers. Analyzes information technology using historical, social, 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) Spring. 4 credits. S. Seth. 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. Examines 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 provides 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, it discusses so-called “postmodernist” critiques of science, and debates the possibilities for “feminist science.”

[STS 6451 The New Life Sciences: Emerging Technologies, Emerging Politics (also GOVT 6449) Fall. 4 credits. Next offered 2009–2010. S. Hilgartner. The new life sciences (including genetics, genomics, and biotechnology) are highly controversial areas of emerging science and technology. They inspire both hope and anxiety, and are a source of ongoing conflicts. This course will examine the politics of the new biology: both to consider the issues in their own right and to examine the relationships among science, technology, and politics. In particular, the course will focus on three themes—the politics of property, the politics of identity, and the politics of risk— as they pertain to the emerging technologies of life. Topics may include the social shaping of biological research; eugenics and genetics; genomic medicine; risk; commercial biotechnology; polity-industry relationships; social movements; North–South issues; the Human Genome Project; genetics and race; intellectual property; the debate over human cloning; and the capacity of contemporary societies to manage emerging technologies.]

STS 6801 Historical Approaches to Science (also HIST 6800) Fall. 4 credits. Prerequisite: graduate standing. P. Dear. Examines philosophical, sociological, and methodological dimensions of recent historiography of science. For description, see HIST 6800.

STS 6811 Philosophy of Science (also PHIL 4810, STS 4811) Fall. 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 2: 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. T. Pinch. 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 699(6991) Graduate Independent Study Fall or spring. 2–4 credits. Permission of department required. Applications and information are available in 300 Rockefeller Hall.
SCIENCE OF EARTH SYSTEMS
See “Department of Earth and Atmospheric Sciences.”

SERBIO-CROATIAN
See “Department of Russian.”

SINHALA (SINHALESE)
See “Department of Asian Studies.”

SOCIETY FOR THE HUMANITIES
Timothy Murray, Director
Fellows for 2008–2009
Monique Allewaert
Marc Aymes
Samuel Baker
Edward Baptist
Verena Conley
Jennifer Gaynor
William Kennedy
Christine Marran
Manuel Monestel
Christopher Monroe
Frédéric Neyrat
Sara Pritchard
Aaron Sachs
Eric Tagliacozzo

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, suitably qualified undergraduates, and interested audiences. The theme for 2008–2009 is “Water, A Critical Concept for the Humanities.”

SHUM 4813 Environments and Waterscapes (also AMST/HIST 4813, BSOC/STS 4381)
Fall. 4 credits. Limited to 15 students.
A. Sachs.

This seminar delves into the humanistic study of the environment. About half of the readings will explore different ways of examining environmental issues in a broad, theoretical framework. The other half will focus on water as a case study, illuminating the ways in which different societies and social groups have both argued about water and found meaning and even inspiration in it. Is the ocean overwhelming or connective? Is a waterfall in a gorge worthwhile as scenery or as hydro power? To what extent is our spatial reality determined by river systems? This is meant as a comparative, interdisciplinary course, ranging across time and space, and drawing on work in history, science and technology studies, landscape studies, literary criticism, cultural theory, geography, and public policy.

SHUM 4814 Liminality in Maritime Archaeology (also HIST 4814, NES 4911)
Fall. 4 credits. Limited to 15 students.
C. Monroe.

This course examines the relationship of humans to bodies of water throughout world history as it relates to the phenomenon of liminality, or transformative thresholds in physical and social space. Course readings will be diverse in temporal, spatial and disciplinary scope, touching on ancient Near Eastern myth, the Bible, Homer, archaeology, economic theory, the Arabian Nights, and Shakespeare. Transformative and destructive aspects of past attitudes toward maritime activities and peoples will be cataloged in order to build an interpretive model for maritime archaeologists.

SHUM 4815 Histories of Maritime Asia (also HIST 4815)
Fall. 4 credits. Limited to 15 students.
J. Gaynor.

This course will examine maritime history in Asia and the Pacific, but will emphasize materials on Southeast Asia. We will draw on work about surrounding areas in order to push our thinking about how histories of maritime Southeast Asia may be written. Readings will include fine-grained studies of European-Asian maritime interactions in the region, and work on Asians from elsewhere who came to it. Yet our main aim will be to take stock of how historians have engaged the concerns, conditions and practices of Southeast Asians. To this end we will discuss both recent and well-known works on the seas and the entangled histories they mediate in coastal and maritime Southeast Asia.

SHUM 4816 Crossing Oceans of Time (also HIST 4816, NES 4916)
Fall. 4 credits. Limited to 15 students.
M. Aymes.

This course seeks to address the complexity of Turkey’s history. Drawing on archival and literary sources, it is conceived of as a workshop in reading, deconstructing and soaking up the flows of this history’s longue durée.

SHUM 4817 Elements, Atlanticisms, Ecologies (also ENGL 4070)
Fall. 4 credits. Limited to 15 students.
M. Allewaert.

In this course, we will draw on philosophy, science studies, and critical theory to produce a dialogue between the related fields of Atlanticism and ecocriticism. Our goal is to gain an understanding of the structuring assumptions of both of these fields, as well as to explore how each is transformed by being put into dialogue with the other.

SHUM 4818 Literature of Maritime Empire (also ENGL 4071)
Fall. 4 credits. Limited to 15 students.
S. Baker.

This course in the literature of the age of sail will introduce students to the difference that a marine perspective makes to our understanding of how modern aesthetics and geopolitics intersect. Texts will include literary works (e.g. Daniel Defoe’s Robinson Crusoe and Felicia Hemans’s “Casabianca”), contemporary histories of the British empire in the period (e.g. David Armitage’s The Ideological Origins of the British Empire and Linda Colley’s Captives: Britain, Empire, and the World, 1600–1850), and shorter textual artifacts and scholarly articles arranged to expose students to the various zones and modes of British and subsequently American maritime imperial endeavor (including points of contact and comparison with the French and Spanish empires). Formal writing assignments will include a short book review and a seminar paper.

SHUM 4819 Water Concepts
Fall. 4 credits. Limited to 15 students.
V. Conley.

This seminar will inquire as to how can we use critical writings of the last four decades to consider water as a critical concept—as what can be studied through both theory and practice. We will examine some of the history of water in the human imagination and review several works that focus on how “water” can indeed be a constitutive element of theory itself. We will then look at the changing representation of water in fiction and film. In the context of current dilemmas about the nourishing condition of the planet we will also address the question of the limits of critical theory as well as literatures whose degrees of effective solvency allow them to pass through and about disciplinary boundaries. Readings include Gaston Bachelard, Gilles Deleuze, Félix Guattari, Michel Serres, Etiene Balibar, Veronica Strang, Vandana Shiva, Patrick Chamoiseau, Hélène Cixous, and others.

SHUM 4921 Music Industry and Society
Spring. 4 credits. Limited to 15 students.
M. Monestel.

This course will focus on contemporary popular music and its relations with the music industry and the market. However, it will also cover the historical development of different musical processes, different migration, political and social factors on the origins of the music. The course will explore concepts like standardization, cultural exchange, cultural industry and cultural identities in relation to different contextual frames in and out the U.S.A.
SHUM 4922 Ocean: The Sea in Human History
Spring. 4 credits. Limited to 15 students. E. Tagliacozzo.
This course looks at the oceans as a canvas for human history. The class moves through a number of different topics and rubrics in respect to the history of the sea (Ancient Seas, Routes, the Age of Discovery, Science of the Sea, and Whaling) before spending individual weeks on each of the world's oceans (the Atlantic, Pacific, Indian Ocean, and the Polar Seas).

SHUM 4923 Renaissance Venice, Queen of Seas (also COML 4923)
Spring. 4 credits. Limited to 15 students. W. Kennedy.
This interdisciplinary seminar will focus upon the social and economic history of the Venetian Republic; its cultural and educational institutions under the aegis of Renaissance Humanism; the evolution of its art, architecture, music, poetry, drama, and opera; and its unique contacts with the Islamic cultures of the Middle East, central Asia, and north Africa. Readings include texts by Italian historians such as Gasparo Contarini and Francesco Guicciardini, French authors such as Jean Bodin and Philippe Desportes, Turkish writers such as Mustafa Ali and Evliya Celabî, Venetian poets such as Gaspara Stampa and Veronica Franco, and English commentators such as William Shakespeare and Henry Blount, with consideration of paintings by Giovanni Bellini, Titian, and Tintoretto, and music by Adrian Willaert, Cipriano de Rore, and Claudio Monteverdi.

SHUM 4924 The Intertidal Zone
Spring. 4 credits. Limited to 15 students.
F. Ney-Turner
The purpose of this seminar consists in testing the concept of liquidation, in order to describe contemporary phenomena of transformation and destruction. We want to analyze the way in which an imaginary of liquids inhabits our representations, and to show the limits of these images by locating the existence of unscented spaces and ontological cleavages which were marked by the large modern process of destabilization of the world. We'll propose an aesthetics of space that would make it possible to avoid the pitfall of solidity-without-flat and flat liquidity. We will insist on limits, transitions and shorelines, in order to answer this ecological question: how to live in an intertidal zone? Course readings will include works of Deleuze, Nancy, Heidegger, Sloterdijk, Schmitt, and others.

SHUM 4925 Rivers in Human Life and Death
Spring. 4 credits. Limited to 15 students. E. Baptist.
Throughout human history, rivers have served as both routes and markers, sources of both life and death, the valleys of civilization and the pathways of destruction, boundaries and pathways that break barriers. Novelists and historians have tried to probe their meanings, to search out the pathways by which they travel down to the sea, or to evoke the foreboding with which modern travelers travel up their pathways into terras incognitas. Moving both chronologically and thematically, focusing on histories and novels, this course aims to explore the various ways in which rivers have shaped human life, society, and culture. We will also discuss the place of rivers in environmental history, looking at how they have fared in modernity—the Rhine, the Congo, and the Mississippi will be our major foci.

SHUM 4926 The Animal/Lit and Crit Theory
Spring. 4 credits. Limited to 15 students. C. Marran.
Recently the animal has come into focus as a subject of great scholarly attention in the humanities, representing an exciting as well as intellectually varied and stimulating field. It is, in a sense, a time of the animal. But it is also a time for the animal time of unprecedented extinctions and of once unimaginable abuses. In this course we will follow the turn to the animal, asking along the way some fundamental questions: What is an animal? What makes the difference between the human and the animal? How have philosophers and novelists engaged the animal and to what ends? How has the animal been understood differently in colonized and colonizing cultures? For our questions we will read a variety of theoretical and literary texts from various global regions.

SHUM 4927 The Amistad Rebellion
Spring. 4 credits. Limited to 15 students. M. Rediker.
This course explores a famous event in American and Atlantic maritime history: a successful rebellion waged by 53 enslaved Africans on a Spanish schooner called the Amistad that took place in 1839 and became, after a series of legal battles in Connecticut, a major event in the Atlantic-wide struggle against slavery. We will use primary sources to reconstruct the uprising at sea and to probe its causes and consequences, all set against a fiery backdrop of Atlantic slave revolt in the 1830s. We will use secondary sources to study the representations and interpretations of the event in both scholarship and popular culture, giving special attention to Steven Spielberg's 1997 film, Amistad.

SOCIOLgy
Sociology is the study of human social organization, institutions, and groups. The Department of Sociology offers courses in a number of key areas: comparative sociology, culture, economy and society, family and the life course, gender inequality, political behavior and public policy, organizations, race and ethnicity, social inequality, social psychology and group processes, social and political movements, and social networks. A particular emphasis of the department is the linkage of sociological theory to issues of public concern such as ethnic conflict, drugs, poverty, and gender and race segregation. Interests of faculty members range from the study of interaction in small groups to the study of economic and social change in a number of different countries. The department offers the opportunity for students to develop fundamental theoretical insights and understanding as well as advanced research skills in quantitative and qualitative methods. Graduates of the department take up careers in university, government, and business settings, and enter professions such as law, management, and urban policy.

Requirements
In addition to the academic requirements established by the College of Arts and Sciences, students must also fulfill requirements toward a specified major. Ten courses are required in the sociology major. All courses toward the major must be taken for a letter grade, and students must maintain at least a 2.0 grade point average (GPA) while enrolling in the major. The courses required for the major are divided into the following categories:

• SOC 1101
• SOC 3750
• two research methods courses (SOC 3010 and 3030)
• six 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 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 1010. B. Cornell.
Introduces students to the distinctive features of the sociological perspective, as opposed to psychological, historical, or economic approaches. First discusses the sociological perspective in the context of small groups and face-to-face interaction. As the course unfolds, the same perspective is applied to progressively larger social groupings, such as peer groups and families, formal organizations, social classes, racial and ethnic groups, and nation states. This approach also provides new insights into such topics as deviance, gender inequality, culture, and lifestyles. Whenever possible, class lectures and
discussions illustrate these themes by exploring contemporary social problems and developments, including the rise of Generation X (and Generation Y), the sources of current racial tensions, and the gender gap in the workplace.

**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; and 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 2009–2010.
V. Nee.
Modern social thought arose out of attempts to explain the relationship between economic development and the social transformations that have taken place in the contemporary world. Classical theorists from Karl Marx and Max Weber to Karl Polanyi focused their writings on emergent capitalist economies and societies. Contemporary social theorists likewise have sought to understand the interaction between capitalism and the social forces reacting against and emerging from modern economic development. From exchange and rational choice theories to network analysis and institutional theory, a central theme in contemporary social thought has been the relationship between the economy and society, economic action and social structure, and rationality and fundamental social processes. This course provides an introduction to social thought and research seeking to understand and explain the relationship between economy and society in the modern era.

**SOC 1150 Utopia in Theory and Practice (SBA-AS)**
Spring. 3 credits. D. Strang.
People have always sought to imagine and realize a better society, with both inspiring and disastrous results. This course discusses the literary utopias of Moore, Morris, and Bellamy, and the dystopias of Huxley, Orwell, and Zamiatin. Also examined are real social experiments, including 19th-century intentional communities, 20th-century socialisms and religious cults, and modern ecological, political, and millennial movements. Throughout, the emphasis is on two sociological questions: What kinds of social relationships appear as ideal? How can we tell societies that might work from those that cannot?

**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 examining 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. T. Pinch.
For description, see STS 2011.

**SOC 2150 Organizations: An Introduction (also DSOC 2150) (SBA-AS)**
Fall. 4 credits. E. Hirsh.
This course examines the fundamental and pervasive role that organizations play in modern society. From universities, hospitals, banks, factories, prisons and churches to museums, and NGOs, contemporary society is inconceivable without organizations. Whether one struggles for change, seeks to protect the status quo, or simply wants to get things done in the modern world, it is crucially important to understand how organizations work. This course will explore such issues as the historical origins of complex organizations, the internal structure and dynamics of organizations, organizations interactions with their external environments, and how organizations change over time.

**SOC 2160 Health Inequality Practicum**
Spring. 4 credits. E. York.
What are the benefits and limitations of social science as a tool for identifying the sources and consequences of health inequalities in the United States? This course introduces the approach of social scientific research in the context of contemporary debates about the social and economic sources of health inequalities, the extent of individual responsibility for health outcomes, and the potential of universal health care for addressing these issues. Students will learn to critically evaluate social scientific research and discourse, and will develop their own rigorous and well-informed inquiry of health inequalities.

**SOC 2180 American Society (SBA-AS)**
Fall. 4 credits. M. Brashears.
The course will explore the nature of American society and community. This will include developing an understanding of historical trends as well as current empirical reality. Special attention will be paid to the impact of social changes on the nature of community and the experience of community members. Theoretical explanations for these processes will then be examined and attention will be paid to how they might be validated or falsified. Finally we will consider how American society might continue to develop in the future.

**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.
This course will explore such issues as the nature of American society and community. This will include developing an understanding of historical trends as well as current empirical reality. Special attention will be paid to the impact of social changes on the nature of community and the experience of community members. Theoretical explanations for these processes will then be examined and attention will be paid to how they might be validated or falsified. Finally we will consider how American society might continue to develop in the future.

**SOC 2225, PHIL 1950) (also DSOC/ILROB/PAM 2220, GOVT 2225, PHIL 1950) (HA-AS)**
Fall. 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 2221 Race, Class, and Gender Research in Practice (SBA-AS)**
K. Weeden.
What are the promises and limitations of social science as a tool for understanding the sources and consequences of social inequality? This course introduces the underlying logic of social scientific research in the context of contemporary debates about social inequality: e.g., educational testing and tracking, race-based affirmative action, and the roles of intelligence and parental resources in affecting who gets ahead. Its goals are to encourage students to be critical consumers of social scientific data, evidence, and discourse and to develop their own rigorous, informed explanations of social phenomena.

**SOCC 2220 Controversies about Inequality (also DSOC/ILROB/PAM 2220, GOVT 2225, PHIL 1950) (SBA-AS)**
Spring. 4 credits. S. Morgan.
Introduces students to contemporary debates and controversies about the underlying structure of inequality, the processes by which it is generated and maintained, the mechanisms through which it comes to be viewed as legitimate, natural, or inevitable, and the forces making for change and stability in inequality regimes. These topics are addressed through readings, class discussion, visiting lectures from distinguished scholars of inequality, and debates staged between
students who take opposing positions on pressing inequality-relevant issues (e.g., welfare reform, school vouchers, immigration policy, affirmative action).

**SOC 2250 Schooling and Society**  
Spring. 4 credits. L. Auf der Heide.  
This course will use classical and contemporary theory, as well as recent research, to study the institution of education. Topics may include: the purpose of education; the changing educational institution; issues of inequality and upward mobility in the education system, and its relationship to inequality in the larger societal context; the school experience for individuals with different demographic characteristics; academic performance and psychological well-being. Finally, we will develop a sociological understanding of current educational policies, such as "No Child Left Behind."

**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 psycho-pathological 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-use 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)**  
Spring. 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 2500 Aging and the Life Course (also HD 2500)**  
Spring. 3 credits. E. Wethington.  
For description, see HD 2500.

**SOC 2550 Sociology of Law (SBA-AS)**  
Fall. 4 credits. E. York.  
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 also shed light on how law is manifest in social interactions of actors within legal institutions (including the Supreme Court, law school classrooms, the jury room, and small claims courts), 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 EDUC 2710/5710, SOC 5710) (SBA-AS)**  
Fall. 3 or 4 credit option. J. Supple.  
For description, see EDUC 2710.

**SOC 2800 Social Movements (SBA-AS)**  
This course presents a sociological examination of the emergence and development of social movements and collective action at both the societal and individual levels. Students will learn about the major theoretical perspectives on social movements, as well as several recent and classical empirical works in the area. Students will learn about a variety of different social movements (both contemporary and historic).

**Methods and Statistics Courses**

**SOC 3100 Evaluating Statistical Evidence (MQR)**  
Fall. 4 credits. Prerequisite: Arts and Sciences students only. M. Brashears.  
First course in statistical evidence in the social sciences, with emphasis on statistical inference and multiple regression models. Theory is supplemented with numerous applications.

**SOC 3200 Design and Measurement (SBA-AS)**  
Spring. 4 credits. S. Soule.  
Research methods are the foundation upon which all research rests. When there are flaws in the methodology, the whole project usually crumbles. This course uses methods texts, and examples from real research projects, to investigate the research methods and logic employed by sociologists. Topics explored include surveys, experimentation, sampling, observation, causal inference, and ethics. By the end of the course, students are able to identify methodological weaknesses in others’ research, and design projects that can withstand methodological scrutiny.

**SOC 3340 Social Networks and Social Processes (SBA-AS)**  
How do groups self-segregate? What leads fashions to rise and fall? How do rumors spread? How do cooperation, law and order and how do they themselves on the Internet? This course examines these kinds of issues through the study of fundamental social processes such as exchange, diffusion, and group formation. Focuses on models that can be explored through computer simulation and improved observation.

**SOC 3700 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 democracies.

**Intermediate Courses**

**[SOC 3110 Group Solidarity (SBA-AS)]**  
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 explores 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)**  
Spring. 4 credits. C. Leuenberger.  
For description, see STS 3111.

**SOC 3180 Contemporary Latin American Societies**  
Spring. 4 credits. M. de Santos.  
This course examines selected aspects of the social landscape of contemporary Latin American societies. We will analyze social, economic, and political changes that have taken place in recent decades. Some of the topics to be covered include: changes in the class structure, gender and race relations; the rise of new social movements and forms of protest in civil society; shifts in economy and state relations and changes in the urban landscapes. Even though cases will be drawn from all over Latin America, this course will be centered in the Southern Cone.

**SOC 3190 Contemporary Sociological Theory**  
Spring. 4 credits. 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. We read the work of seminal theorists and researchers such as Robert Merton, Erving Goffman, James Coleman, Harrison White, and Theda Skocpol. Topics include the development of distinctive lines of argument in areas like the study of the face-to-face group, the modern organization, social movements and social revolutions, inequality, and social mobility. The course considers the relationship between intellectual challenges, techniques of social inquiry, and the social context within which ideas are put forward and take hold.

**SOC 3240 Environment and Society (also DSOC 3240, STS 3241) (SBA-AS)**  
Spring. 3 credits. Staff.  
For description, see DSOC 3240.
The purpose of this course is to help students to think historically and sociologically about the resurgence of religion as a political issue. In order to cover a wide range of time periods and cultures, this seminar views religion through an institutional framework concentrating particularly on the separation of Church and State which has been the hallmark of modern Western political organization. The seminar asks students first, to think about how the boundary between church and state, sacred and secular was negotiated in various nation-states; and second, how that divide encourages toleration and discourages fundamentalisms of various stripes. The institutional focus will lead us to consider the legal frames, i.e., the laws that govern the boundaries between religion and the polity.

SOC 3360 Evolving Families: Challenges to Family Policy (also PAM 3360) (SBA-AS)
Fall. 3 credits. S. Sasser.
For description, see PAM 3360.

SOC 3370 Racial and Ethnic Differentiation (also PAM 3370) (SBA-AS)
Spring. 3 credits. S. Sasser.
For description, see PAM 3370.

SOC 3410 Modern European Society and Politics (also GOVT 3413) (SBA-AS) (SBA-AS)
Fall. 4 credits. S. Van Morgan.
For description, see GOVT 3413.

SOC 3570 Schooling, Racial Inequality, and Public Policy in America (SBA-AS)
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 state-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, policy makers, and journalists use to address these contentious topics.

SOC 3620 Inequality and the Workplace (SBA-AS)
Fall. 4 credits. E. Hirsh.
The work people do is important for all aspects of their lives, including their earnings, social status, where they live, and opportunities for their children. This course examines the sources, extent, and consequences of workplace inequality across gender, racial, and ethnic lines. While traditional explanations of workplace 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 characteristics of the workplace—such as hiring practices, pay scales, workforce diversity, and legal context—produce variation in gender, race, and ethnic inequality. The course concludes with a discussion of how public policy can intervene in the perpetuation of workplace inequality.

SOC 3670 Social Inequalities in Physical and Mental Health (also HD 3570)
Fall. 3 credits. E. Wethington.
For description, see HD 3570.

SOC 3710 Comparative Social Inequalities (also DSOC 3700) (SBA-AS)
Fall. 3 credits. Staff.
For description, see DSOC 3700.

SOC 3750 Classical Theory (SBA-AS)
Fall. 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 will also look at these works’ 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 Advanced Economic Sociology (SBA-AS)
R. Swedberg.
Aims at reinforcing and adding to the insights presented in SOC 1105 Introduction to Economic Sociology (taught by Professor Victor Nee in the fall). Begins with the theoretical foundation of economic sociology (classical and modern). The contributions by Max Weber, Joseph Schumpeter, Mark Granovetter, and others are presented. This segment is followed by a foci on different types of economic organization, from capitalism and the global economy to the firm and entrepreneurship. Topics such as politics and the economy, law and the economy, culture and the economy, and gender and the economy are then discussed. Normative aspects of economic sociology are also on the agenda.

SOC 3970 Israeli–Palestinian Conflict (also GOVT/JWST/NEC 3697, HIST 3970) (SBA-AS)
Fall. 3 credits. Staff.
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 4080, 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 4090 From the Phonograph to Techno (also STS 4091) (SBA-AS)
Fall. 3 credits. Next offered 2009–2010.
T. Pinch.
For description, see STS 4091.

SOC 4100 Health and Survival Inequalities (also DSOC/FGSS 4100) (SBA-AS)
Fall. 4 credits. A. Basu.
For description, see DSOC 4100.

SOC 4150 Internet and Society (SBA-AS)
Spring. 4 credits. M. de Santos.
This course examines how social contexts shape the Internet and how the Internet has changed established institutions. We cover issues such as the “digital divide”; how blogs, news aggregators and online news sites have changed the news media landscape; privacy in the Internet era; and how the Internet has changed and created opportunities for social movements, social identities and communities.

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)
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, and evolutionary models of social change. The remainder of the course (nine weeks) teaches students to program in Delphi and give them simulation programs to modify as a class project.

SOC 4460 Economic Sociology (also SOC 6460) (SBA-AS)
Fall. 4 credits. V. Nee.
This course introduces the field of economic sociology and covers major topics addressed by sociologists studying the intersection of economy and society. We begin with classic statements on economic sociology and then move to the invigoration of the field in recent years, reading works that have been instrumental in this invigoration. Consideration is given to the several variants of “institutionalism” that have informed the sociological study of markets, organizations, and economic exchange.

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. 4 credits. N. Assié-Lumumba.
For description, see ASRC 4606.
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 proposal 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)
This course introduces the classical and contemporary writings on the rise of entrepreneurial capitalism in the West and the global diffusion of the modern entrepreneurial in its rational orientation to profit-making and innovative drive to apply new technologies and ideas to production. Contemporary approaches shift the emphasis away from the analysis of individual attributes and agency to an examination of the role of social networks, organizational forms and institutional environment in facilitating the entrepreneurs and the firm. In the second part of the course, we will examine case studies of entrepreneurs, drawing selectively from novels, movies and autobiographies.

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. 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
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 5050 Research Methods I
Fall. 4 credits. Prerequisite: a first course in statistics and probability. Next offered 2009–2010. Staff.
This course is an introduction to techniques of social inference. We cover research methods, sources of evidence, model design, and questions of empirical validity.

SOC 5060 Research Methods II
Spring. 4 credits. E. Hirsh.
Course on advanced linear regression analysis in theory and practice. After a review of classical bivariate regression and elementary matrix algebra, the course progresses under the credible assumption that the most important fundamentals of data analysis techniques can be taught in the context of simple multivariate linear models. Accordingly, the course provides a relatively formal treatment of the identification and estimation of single equation OLS and GLS regression models, instrumental variable models, traditional path models, and multiple indicator models. Interspersed with this material, the course addresses complications of regression modeling for the practicing researcher including: missing data problems, measurement error, regression diagnostics, weighting, and inference for surveys. The course concludes with a brief introduction to nonlinear regression, counterfactual models of causality, Bayesian inference, and hierarchical models.

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 2009–2010. M. Berezin.
Intended for advanced graduate students interested in comparative methods and research in the social sciences. It is offered in conjunction with the Comparative Societal Analysis program in the Einaudi Center for International Studies. Students enrolled for credit write critiques of papers presented at the seminar by faculty members and other graduate students, and work on their own project. Some weeks are devoted to collective reading and analysis of background work. Students may enroll for more than one semester.

SOC 5180 Social Inequality
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 2009–2010. K. Weeden.
Provides a forum in which students and others can present, discuss, and receive instant feedback on their inequality-related research. Its primary goal is to help students advance their own research; its secondary goal is to introduce selected debates in the contemporary inequality literature in a more comprehensive fashion than is possible in the introductory graduate-level seminar on inequality.

SOC 5270 Artificial Societies (also SOC 4250)
For description, see SOC 4250.

SOC 5280 Conflict and the Nation-State
The nation-state developed out of conflict, through military competition within the European Archipel and the rise of and response to colonial empires in the Americas, Asia, and Africa. Conflict is just as virulent today, as ethnic cleansing and movement toward American imperialism attest. This course examines these conflicts both in comparative historical terms and in terms of fundamental social processes, with an eye to what they tell us about contemporary issues. Questions include: when and why do groups seek to leave polities, through secession or decolonization? When and why do states become imperial powers? How are intra-state and inter-state conflict conditioned by the changing content of nationalism and citizenship, global institutions, and inequalities of wealth and power.

SOC 5400 Organizational Research
Fall. 4 credits. D. Strang.
Seminar focusing on contemporary sociological research on organizations. It centers theoretically on the interplay of institutional, ecological, and micro-theoretic accounts of organizational structure and action. Subjects include organizational founding and mortality; change in organizational practices over time; the relationship between organizations and their legal, social, and cultural environment; and stratification and mobility within organizations.

SOC 5710 Social and Political Context of American Education (also AMST 2710/6710, 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
Spring. 4 credits. Offered every other year; next offered 2010–2011. 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 trust 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 discusses 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 in the Sociology Department bulletin board at the beginning of each semester for current offerings.

SOC 6050 Political Sociology
Fall. 3 credits. Next offered 2009–2010. S. Soule.
This seminar presents the basic approaches to political sociology, with emphasis on the political process in the United States (including the study of both conventional and unconventional politics). Students will learn about explanations for individual participation in both conventional and unconventional politics. Major theoretical and empirical works in this area will be studied.

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. S. Morgan.
After considering alternative modes of explanation in the social sciences, this course offers an introduction to techniques and strategies for estimating causal effects from a counterfactual perspective. For problems where potential outcomes exist because they can be specified for well-defined causal states, alternative data analysis techniques will then be introduced and explained, including matching as stratification, propensity scores as weights in regression analysis, natural experiments as instrumental variable estimators of local average treatment effects, longitudinal data techniques from an interrupted time series perspective, and the front-door criterion for estimating causal effects via the exhaustive modeling of mechanisms. Because the course assumes some familiarity with advanced data analysis techniques, the course is not suitable for students who have not had some training in statistics and data analysis techniques at the graduate level. The course will meet weekly for the first seven weeks of the spring semester. Students who attend the lectures and participate in the discussion of the readings for the first seven weeks should enroll in the pass–fail 2-credit version of the course. Students who wish to carry on in the remaining weeks of the semester to write a term paper using the techniques should enroll in the graded 4-credit version of the course.

SOC 6100 The Sociological Classics
This course is primarily intended for graduate students who lack a background in the classics as well as for those who are only familiar with elementary works such as The Protestant Ethic and the Communist Manifesto. The readings and the discussion will primarily be concentrated to Weber’s Economy and Society, Durkheim’s Elementary Forms of Religious Life and Marx’s Capital. Works by Georg Simmel are also part of the reading list. 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. The main idea is to lay a foundation for future work in sociology. Each class will be in the form of a seminar with mainly discussion. The requirements include active class participation and a research paper on some aspect of the classics. Each class will be introduced by one or several students, who will suggest topics for discussion. The exact way that this will be done, depends on the participants and their interest.

SOC 6300 Cultural Sociology
Fall. 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. S. Tarrow.
For description, see STS 6321.

SOC 6350 Network Sampling and Network Structure
Fall. 4 credits. D. Heckathorn.
Network sampling methods provide means for drawing probability samples of hidden and hard-to-reach populations. These populations are difficult to sample using standard survey research methods because they lack a sampling frame, that is, an exhaustive list of population members from which the sample can be drawn and constructing a sampling frame is not feasible due to the closed nature of the populations networks or associated factors. Populations with these characteristics are important to studies of public health (e.g., drug users and commercial sex workers), public policy (e.g., immigrants and the homeless), and arts and culture (e.g., jazz musicians and aging artists).

This course will survey the use of network-based approaches to sample populations and study the structure of social networks. The focus will range from initial work on biased network theory, through various approaches based on snowball sampling, the “random-walk” approach, adaptive sampling, and link-tracing designs, to a principal focus on respondent-driven sampling (RDS), including the analytics underlying that method, operational procedures, recent work extending the method, the potential for use of RDS to study the structure of very large social networks, and open areas in which further work is continuing and alternative formulations are emerging.

SOC 6460 Economic Sociology (also SOC 4460)
Fall. 4 credits. V. Nee.
For description see SOC 4460.

SOC 6500 Research Methods in Social Movements
Spring. 4 credits. S. Soule.
This seminar presents the dominant research methodologies employed by social scientists studying social movements (surveys, semi-structured interviews, case studies, network analysis, event analysis, participant observation, and historical analyses). In addition to reading about these methods as applied to social movements, we will also discuss the major theories of social movements with an eye toward considering appropriate research designs for empirical examinations of hypotheses derived from these theories. Many historical and contemporary social movements in the United States will be discussed as we examine these methods and theories; for example, the women’s movement, civil rights movement, labor movement, suffrage movement, peace movement, homeless movement, environmental movement, to name just some of these.

SOC 6600 States and Social Movements (also GOVT 6603)
Spring. 4 credits. S. Tarrow.
For description, see GOVT 6603.

SOC 6800 Politics of Transnational Contention (also GOVT 6817)
For description, see GOVT 6817.

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 ILROB 7780)
For description, see ILROB 7780.
SOUTHEAST ASIA PROGRAM


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 also the site for public lectures as well as publication and outreach activities related to this area. 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. 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.

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


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


The theatre major offers studies in the history of theatre, dramatic theory and criticism, playwrighting, acting, directing, design, technology, and stage management. Students interested in the theatre arts major should
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 C cannot be used to fulfill the requirements for a Theatre major.

Honors

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 AUTFP 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.

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. 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 the interpenetration of the history of musical theatre with the history of the United States in the 20th century and beyond. We will investigate how political, social, and economic factors shape the production of important American musicals—and how in turn musicals shape expressions of personal identity and national ideology. Key texts include Oklahoma, Guys and Dolls, West Side Story, Hair, and Rent.

THETR 2230 The Comic Theater (also CLASS 2651, COML 2230) # (LA-AS)
Spring. 3 credits. J. Rusten.
For description, see CLASS 2651.

THETR 2360 Public Voice and Civic Gesture (also DANCE 2450, VISST 2360) #
Fall. 1 credit. B. Suber.
For description, see DANCE 2450.

THETR 2400 Introduction to World Theatre I—Antiquity through 1500 #
Fall. 4 credits. S. Warner.
A survey of practices, literatures, and themes of theatrical 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.
Survey 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 transactional exchanges. Lectures are combined with periodic student projects.

**THETR 2730 Opera (also MUSIC 2241) # (LA-AS)**

Fall. 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/FGS 2760) (LA-AS)**

E. Hanson.

**THETR 3130 Special Topics in Drama and Performance (also ENGL 3760, FGS 3130) # (LA-AS)**

Fall. 4 credits. Next offered 2009–2010.
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.

**THETR 3260 Queer Performance (also FGS 3250) (LA-AS)**

Spring. 3 credits. Limited to 15 students.
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. 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. We will consider such artistic movements as expressionism, symbolism, naturalism, futurism, constructivism, surrealism, and dadaism. The course will conclude with an emphasis on Brecht's epic theater, Artaud's theater of cruelty, and a few of their more contemporary descendants.

**THETR 3360 American Drama and Theatre (also AMST 3360) (LA-AS)**

Spring. 4 credits. Prerequisite: permission of instructor. Limited to 25 students.
This course explores American playwrights from 1900 to 1960, introducing students to American theater as a significant part of modern American cultural history. Our focus will be to consider the ways in which theater has contributed to the construction and deconstruction of a national identity. We will pay special attention to the social, political, and aesthetic contexts of the time period and discuss the shifting popularity of dramatic forms, including melodrama, realism, expressionism, absurdism, and the folk play, in the American theater canon. Authors include: O'Neill, Glaspell, Odets, Rice, Hellman, Hughes, Hurston, Hansberry, Miller, Williams, and Albee, among others.

**THETR 3370 Contemporary American Theatre (also AMST/ENGL 3370) (LA-AS)**

Spring. 3 credits. Limited to 15 students.
S. Warner.
How has theatre helped shape our notion of what it means to be an American in the second half of the 20th century? What role has politics played in recent theatrical experimentation? How has performance been used as a platform for constructing and deconstructing conceptions of identity, community, and nationality? In this course we will examine major trends in American drama from 1960 to the present. Readings for the class focus on those texts that respond directly to or interveses in moments of social crisis, including: the Vietnam War, the Civil Rights Movement, the Women's Movement, the Gay and Lesbian Liberation Movement, and AIDS.

**THETR 3450 The Tragic Theatre (also CLASS 3645, COML 3440) # (LA-AS)**

Fall. 4 credits. Limited to 40 students.
For description, see CLASS 3645.

**THETR 3720 Medieval and Renaissance Drama (also ENGL 3720) # (LA-AS)**

M. Raskolnikov.
For description, see ENGL 372.

**THETR 3750 Studies in Drama and Theatre: "Enemies, A 'Love' Story?" (also ENGL 3750) (LA-AS)**


**THETR 4030 Ritual, Play, Spectacle, Act: Performing Culture (also THETR 6030) (LA-AS)**

Spring. 4 credits. H. Yan.
Takes a broad-spectrum approach to performance. Includes anthropological texts on ritual and play, sociological texts on performances in everyday life, literary studies texts on "performatives" in speech and writing, folkloristic studies on parades and reenactments, psychological and philosophical studies on the role of performance in the formation of identity, as well as standard texts of the theater.

**THETR 4310 Theory of the Theatre and Drama (also AMST 4310, 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. Among the topics covered are: hands-on, live performance projects and a critical study of the interplay between theory and practice.
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 4360] The Female Dramatic Tradition (also FGSS 4330) # (LA-AS)**

Is there a “female dramaticity”? 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)**

For description, see ENGL 4440.

**[THETR 4450] Text Analysis for Production: How to Get from the Text onto the Stage (also ENGL 4751, VISST 4545) # (LA-AS)**
Spring. 4 credits. Limited to 15 students.

Prerequisite: THETR 2500 or 2810 or 3980, or permission of instructor. Next offered 2009–2010. 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. 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.

This is a special seminar sponsored by the John S. Knight Institute's Sophomore Seminars Program. Seminars offer discipline-intensive study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline's outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Limited to 15 students. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

**[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.


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 4520] Seminar in Comparative 20th-Century Anglophone Drama (also COML 4890, ENGL 4601) (LA-AS)**

For description, see ENGL 4601.

**[THETR 5800] Problems in Asian Art: Dancing the Stone: Body, Memory, and Architecture (also ARTH 5850, ASIAN 5581, VISST 5280) # (LA-AS)**
Spring. 4 credits. K. McGowan.

For description, see ARTH 5850.

**[THETR 6000] Proseminar in Theatre Studies # (LA-AS)**
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 6040] Mythology and Postmodern Performance (also THETR 4040) # (LA-AS)**
Fall. 4 credits. Limited to 15 students.

S. Warner.

Why has mythology flourished in performance projects despite the rather marginal position it has occupied in the academy in the past few decades? Does a survey of postmodern performances, especially by so-called “marginal” or “minority” groups, suggest a shift toward a postsecular society? Bringing a variety of divergent discourses into dialogue, this course investigates the critical potentiality mythology holds for both performance theory and social activism. Specifically, it looks to mythology to provide a fresh perspective on cultural performances: sanctioned and unsanctioned forms of transgression; ritualized behavior; initiation and incarceration; and artistic projects aimed at consciousness raising and social change. In what ways does mythology provide an interesting alternative to mimetic and performative strategies? How efficacious is it in representing concepts or situations that cannot adequately be conceived of in language or under the law?

**[THETR 6050] Camp, Kitsch, and Trash (also ENGL 6510, FGSS 6050) # (LA-AS)**

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] Camp, Kitsch, and Trash (also ENGL 6510, FGSS 6050) # (LA-AS)**

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 6600] Passionate Politics (also FGSS 6600) # (LA-AS)**

Complete Course Title: Passionate Politics: Affect, Protest, Performance. This course explores the relationship between affect, performance and political engagement. What role have emotions played in social movements? In the success or failure of political leaders? How do affects such as shame, pride, fear, anger, alienation, compassion, sentimentality, boredom, disgust and paranoia inspire us to act or to refrain from acting? What role do race, class, gender, and sexuality play? Readings may include Plato, Seneca, Augustine, Weber, Durkheim, Freud, Adorno, Jameson, Tompkins, Fanon, Berlant, Ahmed, Ngai, and Massumi.

**[THETR 6720] Research in Shakespeare: Shakespeare and Marlowe (also ENGL 6270) # (LA-AS)**
Fall. 4 credits. B. Correll.

For description, see ENGL 6270.

**[THETR 6300] Melodrama, Modernism, and Modernity (also ENGL 6300) # (LA-AS)**
Fall. 4 credits. N. Salvato.

This course examines the history of melodrama and the various theories, often sharply divergent, that have developed about and around it. Along with the practitioners and critics of melodrama, we ask: Should melodrama be understood as a specific genre, a set of related genres, or as a mode of expression (typically characterized as excessive) that crosses media and periods? Why might melodrama be distinctively modern, and how ought we to define modernity? Is there a pre-modern or early modern melodrama? At the same time that we seek answers to these questions, we will trouble the commonly held assumption that melodrama is incompatible with literary and theatrical modernism(s) and will rather identify the complex ways in which modernist and melodramatic expressions are imbricated with and implicated by each other. Key authors may include playwrights Euripides, Pixerecourt, Colman, Aiken, Shaw, Artaud, Brecht, Stein, Williams, Shepard, and Ludlam; novelists Dickens, Balzac, and James; and theorists Bentley, Booth, Brooks, Elsaesser, Lowe, Singer, and Williams.

**[THETR 6810] Theory of Theatre and Drama (also COML 6051, THETR 4310) # (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 spanning 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 7030] Theorizing Film # (LA-AS)**

**[THETR 7100] The Pedagogy of Theatre # (LA-AS)**
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. Staff. Registration only through roster in department office, 223 Schwartz Center. No online registration. Staff. Required of students participating 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 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 or 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.

THETR 2810 Acting I (LA-AS)
Fall or 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. A. Van Dyke.

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.

THETR 2850 Advanced Studies in Acting Techniques (LA-AS)
Fall or spring. 3 credits; may be repeated for credit. Limited to 8 students. Prerequisites: THETR 2810, audition, and permission of instructor. M. Dreyer.

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. Staff. 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)
Fall. 3 credits. Limited to 10 students. Prerequisite: THETR 2810 and permission of instructor. Next offered 2009–2010. B. Milles.

THETR 3850 Advanced Studies in Acting (LA-AS)
Fall or spring. 3 credits; may be repeated for credit. Limited to 8 students. Prerequisites: THETR 2810, audition, and permission of instructor. M. Dreyer.

THETR 3860 Solo Performance
Fall. 4 credits. Prerequisites: THETR 2800, 2810, and permission of instructor. B. Levitt.

THETR 3870 Senior Seminar in Theater Exploration
Spring. 3 credits. Prerequisites: 3000-level acting course and/or senior theater student by permission of instructors. Next offered 2009–2010. B. Milles and A. Van Dyke.

THETR 3880 Playwriting (LA-AS)
Fall. 4 credits. Prerequisites: THETR 2800 or permission of instructor. Next offered 2009–2010. B. Milles.

THETR 4100 Advanced Playwriting (LA-AS)
Spring. 4 credits. Prerequisite: THETR 3840 or permission of instructor. Next offered 2009–2010. B. Milles.

THETR 4460 Internship in Workshop Directing
Fall or spring. 1–2 credits. Prerequisite: THETR 2800 and permission of instructor. Staff. Recommended: THETR 2500 and 2810. D. Feldshuh.

THETR 4810 Senior Seminar in Theater Exploration
Spring. 3 credits. Prerequisites: THETR 4460, 2500, 2800, 3980, 4980, and permission of instructor. D. Feldshuh.

THETR 4980 Fundamentals of Directing II (LA-AS)
Fall. 4 credits. Limited enrollment. Prerequisite: THETR 2800 and 3980, and permission of instructor. Recommended: THETR 2500 and 2810. D. Feldshuh.

THETR 4990 Practicum in Directing
Fall or spring. 1–4 credits. Prerequisites: THETR 4460, 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 assist a direct a faculty or guest director.

DIRECTIONS

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 2980 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.

THETR 3480 Playwriting (LA-AS)
Fall. 4 credits. Limited to 12 students. Prerequisite: permission of instructor. Next offered 2009–2010. B. Milles.

THETR 3490 Advanced Playwriting (LA-AS)
Fall. 4 credits. Prerequisite: THETR 3480 or permission of instructor. Next offered 2009–2010. B. Milles.

THETR 3490 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. Focus is on the clarification of dramatic action with emphasis on conflict, theatrical language and refining the visual impulse.
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 only through department roster 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. 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 2009–2010. 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. Includes writing in response to readings, audio and video recordings, and performances. Some classes devoted to creating sound, movement, and lighting.

**THETR 3410 CAD Studio for Theatre Design**
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. 3 credits. Limited to 10 students. Prerequisite: THETR 2500 and 3400 or permission of instructor. Recommended: experience in theatre production and graphic skills. Students are required to purchase materials that instructor will specify (approx. cost $50). S. Lambert. An exploration of the design process for theatre. Projects employ various media to explore dramatic use of architecture, the scenic space, and elements of interior design.

**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. Prerequisite: THETR 2500 or permission of instructor. E. Intemann. Concentrates on designing costumes for contemporary dance. Focuses on theme, costume, and character development.

**THETR 3680 Sound and Digital Audio (also DANCE 3680, MUSIC 3431) (LA-AS)**
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 use of software such as 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 lilter software required. See www.cycling74.com for student software pricing. Lab performance at end of semester. W. Cross and A. Fogelsanger. Introduction to the multimedia programming platforms MAX/MSP/lilter and their application to computer-interactive dance (interactive technology). Intended to bring together programmers and dancers. Each student will create software patches and movement pieces, and collaborate with others on a final project focusing on the input, manipulation, and output of movement, sound, video, graphics, and lighting in live dance performance. Topics include digital audio/video processing, MIDI control, sensors, etc.

**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. 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, make-up, masks, and wearable forms of puppetry.

**THETR 4200 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)**
Spring. 3 credits. Prerequisite: THETR 3640 or permission of instructor. Students are required to purchase materials that instructor will specify (approx. cost $50). S. Bernstein. Explores unconventional design techniques 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, make-up, masks, and wearable forms of puppetry.
Technology

THETR 2560  Technical Production Studio II
Spring. 3 credits. Limited to 6 students. $50.00 materials fee. Prerequisite: THETR 2500 or permission of instructor. Additional hands-on time in prop and paint shops required to be discussed. C. Seekatz and T. Ostrander.

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 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/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.

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 assistant stage manager for a season 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, 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.

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 the Schwartz Center.

### Film
Faculty: A. Villarejo, D. Fredericksen (director of undergraduate studies in film; on leave spring 2009), S. Hyenmi, A. Hiss, L. Patti, M. Ritchin (on leave fall 2008).

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 on campus, 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 formal and 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) majorsing 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 (director of undergraduate studies in film).

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 or better 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, 4770, 4780, 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; prerequisite for film majors: FILM 2740) 4
   - [FILM 3760 History and Theory of Documentary and Experimental Film (offered alternate fall semesters; next offered fall 2009) (prerequisite for Film majors: FILM 2740)] 4
   - FILM 3770 Introduction to 16mm and Digital Filmmaking (offered fall 2008, fall 2009 and spring 2010; not offered spring 2009) 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 2650 Studies in Film Analysis: Hitchcock’s Films (offered fall 2009)] 4
   - FILM 2760 Survey of American Film (offered fall 2008) 4
   - [FILM 3290 Political Theory and Cinema (Next offered 2010–2011)] 4
   - [FILM 3130 Film and Social Change (also AMST 3050) Americans Abroad (offered alternate years; next offered 2009–2010)] 4
   - [FILM 3440 American Film Melodrama (next offered 2009–2010.) ] 4
   - [FILM 3460 Film Noir (next offered 2009–2011)] 4
   - FILM 3690 Fast-Talking Dames and ad Ladies: 1940s and Now (offered yearly; offered fall 2008) 4
   - [FILM 3790 Modern Documentary Film (offered alternate spring semesters; offered spring 2010)] 4
   - FILM 3830 Screenwriting (offered spring 2009) 4
   - FILM 3930 International Film of the 1970s (offered fspring 2009) 4
   - FILM 4220 Cinematography (offered spring 2009) 3
   - [FILM 4550 History of Modern Polish Cinema (next offered fall 2009)] 4
   - [FILM 4730 Film and Spiritual Questions (offered alternate spring semesters; next offered spring 2010)] 4
   - [FILM 4740 Jung, Film, and the Process of Self-Knowledge (offered alternate years; offered spring 2011)] 4
   - FILM 4750 Seminar in the Cinema I (offered most years; offered fall 2008 and fall 2010; topic varies; may be repeated for credit) 4
   - [FILM 4760 Seminar in the Cinema II (offered spring 2011; topic varies; may be repeated for credit)] 4
   - [FILM 4770 Intermediate Film and Video Projects: Documentary and Experimental Workshop (offered alternate years; offered fall 2009)] 4
   - FILM 4780 Intermediate Film and Video Projects: Narrative Workshop (offered alternate years; offered fall 2008) 4
     - 4
   - FILM 4930 Advanced Film and Video Projects (offered spring 2009 and spring 2010) 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, you will need to 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 4770 and FILM 4780, Intermediate Film and Video Projects I and II; 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, 4770, 4780, and 4930), given current demands upon those courses by the film majors. This restriction does not apply at the moment 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/academicsfilm/FilmMinorRequirements.asp or go to room 223 at the 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 require a written analytical component related to the creative work.

The Advanced Undergraduate Filmmaking Program
Through FILM 4930 coursework, the department offers an 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.

[FILM 2650 Studies in Film Analysis: Hitchcock’s Films (also ENGL/FGSS 2630) (LA-AS)]

[FILM 2740 Introduction to Film Analysis: Meaning and Value (also VISST 21740/174) (LA-AS)]
Fall. 4 credits. Recommended: some course background in film analysis. Offered alternate years; next offered 2009–2010.

[FILM 2760 Survey of American Film (also AMST 2760, VISST 2340) (LA-AS)]
Fall. 4 credits. Required film screenings; discussion once a week. S. Haenni.
For description, see AMST 2760.

[FILM 2930 Middle Eastern Cinema (also JWST/NESS 2793, VISST 2193) (LA-AS)]
Fall. 4 credits. Limited to 40 students. Graduate students must enroll in FILM 6740. D. Fredericksen.

[FILM 3240 Animation Workshop: Experimental and Traditional Methods (LA-AS)]

[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 2550, GOVT 3705) (CA-AS)]
Spring. 4 credits. G. Waite.
For description, see GERST 3550.

[FILM 3430 Inter/National Cinema (CA-AS)]
Spring. 3 credits. L. Patti.

The terms transnational and global are frequently invoked to describe contemporary internationalization of cinema. This course will analyze global cinema in relation to national cinemas. We will examine the major theories of national cinema, investigating the complicated local, regional, and international investments of particular national film industries. We’ll then explore the history of international co-productions, positioning these extra-national industrial arrangements with respect to national film histories. Finally we’ll consider current formations of global cinema, assessing the status of the nation as an industrial, political, and aesthetic influence in the contemporary film. Our wide-ranging survey of cinematic traditions will emphasize the roles of language, technology, and stardom in the cinemas of the U.S., Italy, India, China, Cuba, Mexico, Canada, Senegal, Iran, and France, among others.

[FILM 3440 American Film Melodrama (also AMST/ENGL 3440, FGSS 3450, VISST 3645) (LA-AS)]

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)]

Hollywood films of the 1940s–1950s known for their stylistics and commentary on the dark side of American life, and “neo-noir” from the 1970s to the present.
FILM 3690 Fast-Talking Dames and Sad Ladies: 1940s and Now (also ENGL/FGS 3690) (LA-AS)
Fall. 4 credits. L. Bogel.
For description, see ENGL 3690.

FILM 3750 History and Theory of the Commercial Narrative Film (also VISST 3175) (LA-AS)
Fall. 4 credits. Prerequisite for film majors FILM 2740. S. Haenni.
Consideration of the broad patterns of narration in the history of the commercial narrative film. Films are placed in the early articulation of a cinematic means of narration, realism as an artistic style, the nature and functions of popular film, and the rise of modernist and post-modernist "art cinema" narration.

[FILM 3760 History and Theory of Documentary and Experimental Film (also VISST 3176) (LA-AS)]
Fall. 4 credits. Highly recommended: FILM 2740. Offered alternate years; next offered 2010–2011. 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. 2008; spring, 2010. 4 credits. Limited to 12 students. Intended for juniors and seniors (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 $50. A. Hiss and M. Rivchin.
Creative, hands-on production course in filmmaking, emphasizing the development of original ideas and the acquisition of basic technical skills in both 16mm and miniDV formats: cinematography, lighting, sound recording and editing, and film and non-linear digital editing. Students complete several exercises and two short projects. The final project may be narrative, documentary, experimental, or animation and is shown in a public screening at the end of the semester on campus.

[FILM 3790 Modern Documentary Film (LA-AS)]
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 3812 Edge Cities: Cellular New York and Los Angeles (also AMST 3812)
Spring. 4 credits. S. Haenni and M. Woods.
For description, see AMST 3812.

FILM 3830 Screenwriting (LA-AS)
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. A. Hiss.
This course explores the fundamentals of traditional Hollywood and independent screenplays.

FILM 3930 International Film of the 1970s (also AMST/VISST 3930) (LA-AS)
Spring. 4 credits. Recommended: some background in film analysis. S. Haenni.
The seven-year period (1968–1975) witnessed innovation and cross-fertilization in film history and film style. Profound changes in the film industry and film technology, along with larger social, political, and cultural developments, enabled new ways of understanding—and using—the cinematic image as well as film sound. This course considers how the social, political, and cultural upheavals of the late 60’s (the student movement, Watergate, the war in Vietnam, terrorism, etc.) affected film aesthetics, narrative, and style. Topics may include the "new" Hollywood and the reworking and rejuvenation of American film genres (neo-noir, western, horror film, road movie), European art cinema; the emergence of non-Western cinemas (esp. African), and film subcultures (such as black independent film and blaxploitation).
Screenings are guided by readings in film criticism and film history.

FILM 4200 Liveness: Media, Performance, and Theory (also FILM 6200) (CA-AS)
Fall. 4 credits. A. Villarejo.
For description, see FILM 6200.

FILM 4220 Cinematography (LA-AS)
Spring. 4 credits. Limited to 8 students. Pre- or corequisite to FILM 4930.
Prerequisites: Permission of instructor. Letter grades only. Equipment fee: $150. Advanced camera and lighting techniques, designed for students who have taken at least FILM 3770 and/or advanced photography course or computer animation courses. The course may also include a section devoted to acting and directing for the camera; consult the instructor, M. Rivchin.
Students work on a series of tests, short exercises, and scene projects using sync and non-sync 16mm cameras, digital video cameras, camera movement apparatus, lighting instruments, a range of lighting instruments, filters, and gels, and digital video cameras to expand their knowledge of the technical and aesthetic aspects of cinematography.

[FILM 4300 Topics in American Studies: The Cinema and the American City (CA-AS)]
Fall. 4 credits. Weekly screenings TBA.
The emergence of the cinema in the late-19th century coincided with the emergence of a new kind of metropolis, characterized, among other things, by new traffic systems (elevated train, subway, automobile), new racial, ethnic, and sexual regimes, and new urban planning. The cinema was inevitably affected by the ways in which the city developed, while at the same time it also made the city legible. In this course, we will begin with the early American cities and towns have been represented in film in different ways, as, for instance, musical symphonies, mysteries to be deciphered, or post-apocalyptic wastelands. We will explore how gender, racial, ethnic, class and sexual identities are negotiated in the modern, cinematic city. Screenings will range from silent and early sound films, such as The Crowd and L’Atalante, to contemporary cinema, such as Do the Right Thing and Blade Runner. Our viewings will be guided by readings in film and urban theory and history.

[FILM 4550 History of Modern Polish Film (LA-AS)]
Fall. 4 credits. Prerequisite: some film analysis or European history course work. Next offered 2009–2010. D. Fredericksen.
Analysis of Polish film from its origins to the present, within the context of Poland’s postwar history.

FILM 4730 Film and Spiritual Questions (LA-AS)
Spring. 4 credits. Limited to 20 students. Offered alternate years; next offered 2009–2010. 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 theologian.

[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 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. D. Fredericksen.
Topics for fall 2008: Close analysis of fourteen films of Ingmar Bergman in the contexts of European art cinema and Bergman's creative biography from the 1940s to his death in 2007.

[FILM 4760 Seminar in the Cinema II (LA-AS)]
Fall or spring. 4 credits. Offered occasionally; next offered spring 2011.

[FILM 4770 Intermediate Film and Video Projects: Documentary and Experimental Workshop (also VISST 4770) (LA-AS)]
Fall. 4 credits. Limited to 8 students. Prerequisites: FILM 3770 as minimum production; priority given to those who have taken FILM 3760, 3790, or 3860 and permission of instructor based on project proposals. Equipment fee: $150 (paid in class). Film projects costs: $300–$1,500; video: $100–$400. Next offered 2009–2010. M. Rivchin.
Intensive course in 16mm filmmaking and digital video in which each student develops a significant documentary or experimental project both critically and creatively.

FILM 4780 Intermediate Film and Video Projects: Narrative Workshop (LA-AS)
Fall. 4 credits. Limited to 8 students.
Prerequisites: FILM 3770 as minimum production; priority given to those who have taken FILM 3760, 3790, or 3860 and permission of instructor based on proposals. Equipment fee: $150 (paid in class). Film projects costs: $500–$1,500; video: $100–$200. Staff.
Intensive course in 16mm filmmaking and digital video in which each student develops a significant original narrative script project that he or she then directs, shoots in crews, and edits. Student may opt for narrative-documentary or narrative-experimental work as well. Readings, discussions, and exercises are designed to increase the student's knowledge and practice of directing, cinematography, lighting, sync-sound filming, and editing techniques; working with labs and...
sound houses, digital video camera; and digital (Final Cut Pro, AVID, and ProTools) editing.

**FILM 4850 Undergraduate Internship**
Summer. 1–5 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 4920 Advanced Film and Video Projects (LA-AS)**
Spring. 4 credits limited to 6–8 students. Permission only. Prerequisites: minimum FILM 3770, priority given to those who have taken 3420, 4770, or 4780. Recommended: FILM 3850 and THEATR 3980. Equipment fees: $150. Project costs: $500–2,000. M. Rivchin.

Intensive filmmaking course in which students focus on developing and producing a single, already-proposed (15–30 min.) 16mm film or digital video project over the semester. Students direct and edit their own (or collaborative) projects working in crews for sync-sound dialog narrative films or documentaries and in small groups for technical exercises and assisting in non-sync projects. Readings, discussions, and exercises are designed to increase the student's knowledge and practice of script revision, directing, scene breakdowns, auditions, and casting; cinematography, lighting, sync-sound filming, and editing techniques; working with labs and sound houses; digital video camera; and digital (Final Cut Pro, AVID, and ProTools) editing.

**FILM 6200 Liveness: Media, Performance, and Theory (also FILM 4200)**
Fall. 4 credits. A. Villarejo.
This graduate seminar returns to a core, foundational, defining facet of media and cultural practice: *liveness*—that is, liveness—in the context of philosophical accounts of *life.* "Liveness" is the ontological condition of performance itself: "Performance implicates the real through the presence of living bodies." Phil Auslander's rejoinder is that "mediatedness" is a secondary effect of mediatized culture or mediation, proposes a different coupling of technologies and bodies, but one that nonetheless takes ‘liveness’ as a profound structuring ideology of cultural practice. Similarly, 'liveness' is at the basis of the transmission technologies of modern media such as television: the simultaneity of the event and its transmission distinguishes television and live streaming from other technologies of capture and recording. Recent scholars, including Phil Rosen, have challenged these distinctions by emphasizing the documentary nature of most image-production, in which 'life' is reproduced by the very ontological residue of photographic models. "Life," as well as death, inheres in images, in other words, regardless of whether they stream or transmit instantaneously.

What is this life that is constituted/disseminated/redistributed/contested through media and performance? What are the historical and theoretical models for these forms of life? And what conception of "life itself" undergirds the presence felt as "liveness"? In this seminar, we will follow philosopher Giorgio Agamben's invitation to think further about the potential character of life, exploring 'liveness' across a number of sites: television, cinema, performances, courts, operating theatres (if possible at Weill Cornell Medical School), and media art.

**FILM 6740 Introduction to Film Analysis: Meaning and Value**
Fall. 4 credits limited to 10 graduate students. 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, 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 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 2008–2009. 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.

**ANTH 2432 Media, Culture, and Society**
Fall 3 credits. Boyer.

**ASIAN 3387 Literature and Film of South Asia**
Fall. 4 credits.

**ASIAN 4410 Chinese Film**
Spring. 4 credits. Gunn.

**ASIAN 4436 Topics in Indian Film**
Spring. 4 credits. Gold.

**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. Athen.

**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. Jeffers.

**GOVT 4809 Politics of '70s Film**
Spring. 4 credits. Kirshner.

**ITAL 2950 Cinematic Eye of Italy**
Fall. 3 credits. Righi.

**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, A. Fogelsanger (director of undergraduate studies in dance), E. Intemann, J. Kovar, J. Morgenroth, J. Self (on leave spring 2009), B. Suber.
The dance program offers courses in dance technique, improvisation, composition, performance, and 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 towards the 40 credits fulfilling the major.

The major: 40 credits (towards which the prerequisites for the major count) are required of all students majoring in dance as follows:
1. 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 toward the major.

II. 14 credits: Dance composition (DANCE 2200, 2210) and history/theory (DANCE 3141, 4080).

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 four 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, and 1302; and THETR 2500 and 3840.

**Honors**

Students who have maintained a GPA of 3.5 in classes for the dance major and an average of 3.0 in all courses may elect to work for honors in dance during their senior year. They must consult with their advisor in the spring of their junior year about the honors program in dance.

**Minor in Dance Requirements**

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 225 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.cornell.edu/theatrearts/academics/dance/roma2.pdf.

**Dance Technique**

Students may register for any Western dance technique course (DANCE 1200, 2200, 2210, 2220, 2240, 3210, 3220, 4210, and 4220) for 0 or 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 additional dance technique courses must be taken for 0 credit. 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 1520) may be taken for 0 or 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 1520) 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 225 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 non-introductory 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. Kovar; 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 1300 World Dance Techniques**

Spring. 0 to 1 credits. Faculty. Study and practice of basic movement vocabulary and dances in performance traditions outside of the European and American concert genres of ballet and modern dance. Specific form to be studied will vary. No previous experience in dance is necessary. May be repeated for credit.

**DANCE 1500 Dance Performance Workshop**

Fall and spring. 1 credit. Attendance at dance concerts is required. May be repeated. May not be taken simultaneously with a dance composition course (DANCE 2500, 3500, 3510, 4500 or 4510) S–U grades only. Fall, J. Morgenroth; spring, J. Chu.

Students learn and perform dances choreographed by Dance Composition students. Course work includes: rehearsing an average of two hours a week with student choreographers, attending dance composition class (faculty led) once a week for 90 minutes, and possibly performing in departmental dance productions or mid or end of semester class showings. Students in this course will receive feedback on their performances from the faculty member teaching the Composition course and from the composition students within class discussion periods, to help them refine their skills as performers (including dynamics, focus, phrasing, rhythm, dramatic presence, etc.) in both classroom and public showing of student work. They will sometimes participate in class discussion of the student compositions, gaining insight into the compositional process. This type of participation will be an introduction to dance composition for students interested in pursuing the composition curriculum.

**DANCE 2200 Dance Technique II (also PE 1181)**

Fall. 0 to 1 credit; may be repeated. S–U grades only. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. 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. 0 to 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S–U grades only. Next offered 2009–2010. B. Suber.

Introductory Western classical technique intended for students with some dance training. Includes basic barre and center work focusing on presence and presentation.

DANCE 2220 Dance Technique II/Modern (also PE 1183)
Spring and summer. 0 to 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. J. Morgenroth.

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 2440)
Spring and summer. 0 to 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S–U grades only. Requirements include attendance at performances with written responses. Spring, J. Kovar; summer, B. Suber and J. Chu.

Spring 2009 Topic: Dancing to Music. “Music produces a kind of pleasure which human nature cannot do without.” This course will take a journey through music using music as its driving force. The rhythms of International, Trance, didgeridoo, percussion, and other World Music, both live and recorded, will be used to create a receptivity to the flow of energy within and to channel it into movement. Explorations will include structured improvisation, solo and partner work, group choreography, as well as movement games inspired by modern dance and Tai Chi. Beginners and those with prior dance experience are welcome.

DANCE 2410 Explorations in Movement and Performance (also PE 1191)
Spring. 0 or 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)
Fall and summer. 3 credits. Permission of instructor. Letter grades. Requirements include attendance at performances with written responses, selected readings, and home-movie production. 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 with classmates and exchange movement ideas.

DANCE 2450 Public Voice and Civic Gesture (also THETR 2360)
Fall and summer. 1 credit. B. Suber.

This course combines acting and movement techniques encouraging process-oriented work. Focusing on performance in civic spaces, the course examines the politics of status and the social role of body (including vocal) expression of both performer and audience. Working within the specific context of urban public spaces, the class will question the function of monument and the character of urbanism in relation to individual bodies while understanding how these bodies combine to create a body politic. The class will consider traditional tools of political and social satire, including Commedia dell’Arte. Fundamental in commedia is the exploration of status, the gradations of power and influence and role-playing. Students will create their own texts and movement as well as draw from other theatrical and visual sources. The class will conclude with a public performance.

DANCE 2480 Dance Improvisation
Fall, spring, and summer. 1 credit. Limited to 12 students. Attendance at dance concerts required. S–U grades only. J. Morgenroth.

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, summer. 0 to 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. 0 to 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S–U grades only. J. Morgenroth.

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, and J. Morgenroth; spring, J. Chu, B. Suber, and J. Koyar.

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. 0 or 1 credit. Prerequisite: permission of instructor. Attendance at dance performances required. J. Chu.

Reconstructs a dance by an important modern dance choreographer. Through a close examination of the composer’s 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
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. Next offered 2009–2010. 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. 0 to 1 credit; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S–U grades only. J. Chu.

Advanced and pre-professional Modern classical. A continuation of and supplement to DANCE 3210.

DANCE 4220 Dance Technique IV/Modern (also PE 1187, VISST 4220)
Fall and spring. 0 to 1 credits; may be repeated. Satisfies PE requirement if taken as PE. Attendance at dance concerts required. S–U grades only. J. Chu.

Advanced and pre-professional Modern technique. A continuation of and supplement to DANCE 3220.

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, J. Morgenroth; spring, J. Chu; summer, B. Suber and J. Chu, J. Koyar.

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 2500 Intermediate Dance Composition I (LA-AS)
Fall, spring, and summer. 3 credits.

Prerequisite: DANCE 2500. Fall, J. Morgenroth; spring, J. Chu; summer, B. Suber and J. Chu.

Intermediate choreographic projects are critiqued in progress by faculty and peers.
Consideration of design problems in costume 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, J. Morgenroth; spring, J. Chu; summer, B. Suber and J. Chu.
Continuation of DANCE 3500. For full description, see DANCE 2500.

DANCE 3520 Music and Choreography (also MUSIC 4512) (LA-AS)
Spring. 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; 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 examines 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 polystylistism.

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.
First of a two-semester sequence (the second is DANCE 4020) for senior dance majors.
Students create a project in choreography and performance, 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 4020 Senior Project in Dance II
Fall or spring. 3 credits. Prerequisite: DANCE 4010.
Second of a two-semester sequence (the first is DANCE 4010) for senior dance majors.

DANCE 4500 Advanced Dance Composition I (LA-AS)
Fall and spring. 3 credits. Prerequisite: DANCE 3510. Attendance at dance concerts required. Fall, J. Morgenroth; spring, J. Chu.
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 and spring. 3 credits. Prerequisite: DANCE 4500. Attendance at dance concerts required. Fall, J. Morgenroth; spring, J. Chu.
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)]
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? How is dance designed to promote a critical appreciation of dance, its values and its ambitions, by developing an historical and cultural understanding.

DANCE 4000 Senior Paper in Dance
Fall and spring. 4 credits. Prerequisite: DANCE 4080, senior standing. Attendance at dance concerts is required. Under faculty direction, the students write a senior 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, B. Suber; summer, B. Suber and J. Chu.
Topic for spring 2009: ‘50s Movie Musicals and Modernism. Utilizing, as a point of departure, films such as A Star is Born and White Christmas, this seminar will explore modernist spatialities, as defined through body movement and architecture. Rising tensions between popular entertainment and modernist impulses, and between stage, screen, and television, will be examined. Camp as queer sensibility in non-musical films such as All About Eve, and semi-musicals such as Beyond the Valley of the Dolls, will be related to the movie musical, modern dance, modern architecture, and modern art practices. Also, the class will look to the Hayes Code as arbiter of a surrealistic aesthetic from films such as An American in Paris to television specials such as Raquel, featuring a futuristic, Barbarella-esque, Raquel Welch.
Topic for summer 2009: 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 paribas, 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. 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, to modern dance, minimalism, and postmodernism. Includes readings of Sally Banes, Monroe Beardsley, Walter Benjamin, Hans Bertens, Peter Berger, Italo Calvino, Roger Copeland, Susanne Langer, David Michael Levin, Susan Sontag, and others.

Interdisciplinary Courses

[DANCE 2580 Courses of Action: Producing Performance Locally, Regionally, Globally (LA-AS)]
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 or spring. 3 credits. Prerequisites: laptop computer and MAX/MSP software and Jitter software required, see www.cycling74.com for student software pricing. Lab performance at end of semester. 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 2009–2010. 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 Corporate Realities (also FILM/ITAL 2370, VISST 3210)
Summer. 4 credits. B. Suber, J. Rhodes, and B. Milles. Held in Rome, this course examines that modern city as if 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 suburban EUR. 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. Next offered 2009–2010. 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 4550 Techno Soma Kinesics II: Repositioning the Performing Body in Space through the Lenses of Digital Media (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 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.

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.

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. 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 2630 Dance Stage Management Laboratory II
Fall and spring. 1–4 credits; may be repeated for credit. Prerequisite: permission of instructor. Orientation meeting at 7:30 p.m. in Kiplinger Theatre at Schwartz Center. P. Lillard, D. Hall, F. Sellers, and R. M. Mackie. Practical experience in dance production, as a light board operator, sound board operator, video operator, or head dresser.

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)
Spring. 3 credits. W. Cross. For description, see THETR 3680.

DANCE 4660 Lighting Design Studio II (also THETR 4620)
Spring. 4 credits. E. Intemann. For description, 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 225 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 as 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 3560 Sound Design Studio
Upon admission to the program:
THETR 4510 Production Lab IV (at least 1 credit)
Recommend for Technical Direction emphasis:

**THETR 2520** Technical Production Studio I

**THETR 2560** Technical Production Studio II

**THETR 2400** 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)

Recommend for Stage Management emphasis:

**THETR 2520** 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

**THETR 4530** 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 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. J. Rickard. 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 methods of defining and analyzing art objects. Guest lecturers occasionally address the class. Requirements: two objective midterm exams; occasional listserve postings; two five-page papers.

**VISST 2190** Middle Eastern Cinema (also COML 2293, JWST/NES 2793)


For description, see NES 2793.

**VISST 2300** Survey of American Film (also AMST/FILM 2760) (LA-AS)

Fall. 3 credits. S. Haenni.

For description, see AMST 2760.

**VISST 2430** Hip-Hop Hollywood (also DANCE 2430, PE 1189)

Fall. 5 credits. J. Self.

For description, see DANCE 2430.

**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) # (M-A-AB)

Fall. 4 credits. Each student must enroll in a sec. 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. Staff.

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 3305** Visual Perception (also PSYCH 3050)

Fall. 4 credits. Limited to 20 students. Prerequisite: PSYCH 250 or permission of instructor. Next offered 2009–2010. J. Cutting.

For description, see PSYCH 3050.
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 3519 Music, Dance, and Light (also DANCE 3590, THETR 3190) Spring. 3 credits. Next offered 2009–2010. E. Intemann and A. Flegelbauer. For description, see DANCE 3590.

VISST 3560 Computing Cultures (also COMM 3560, INFO/STS 3561) Spring. 4 credits. P. Sengers. For description, see STS 3561.

VISST 3620 Lighting Design Studio I (also DANCE 3660, THETR 3620) Fall. 4 credits. E. Intemann. For description, see THETR 3620.

VISST 3650 History and Theory of Digital Art (also ARTH 3650, INFO 3660) Fall. 4 credits. Next offered 2010–2011. M. Fernandez. For description, see ARTH 3650.

VISST 3655 The House and the World: Architecture of Asia (also ARTH 3855) # (CA-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. Recommend: ARTH 2400. L. Meixner. For description, see ARTH 3760.

VISST 3696 Arts of Southeast Asia (also ARTH 3850) # (CA-AS) Fall. 4 credits. K. McGowan. For description, see ARTH 3850.

VISST 3735 Modern Western Drama, Modern Western Theatre: Theory and Practice (also ENGL/THETR 3350) Fall. 4 credits. Next offered 2009–2010. N. Salvato. For description, see THETR 3350.

VISST 3740 Painting 19th-Century America (also AMST/ARTH 3740) # (CA-AS) Fall. 4 credits. Recommended: ARTH 2400. L. Meixner. For description, see ARTH 3740.

VISST 3798 Fundamentals of Directing I (also THETR 3990) (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 3990.

VISST 3812 Edge Cities: Celluloid New York and Los Angeles (also AMST/ARCH/FILM 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) Fall. 4 credits. Next offered 2009–2010. B. Milles. For description, see THETR 3840.

VISST 3870 Literature and Film of South Asia (also ASIAN 3387, COML 3380) # (CA-AS) Spring. 4 credits. A. Banerjee. For description, see COML 3380.

VISST 3930 International Film of the 1970s (also AMST/COML/FILM 3930) Fall. 4 credits. Next offered 2009–2010. S. Haenni. For description, see FILM 3930.

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 4220 Dance Technique IV/Modern (also DANCE 4220, PE 1187) Fall. 1 credit. By placement only; no pre-enrollment. Attendance at dance concerts required. J. Chu. For description, see DANCE 4220.

VISST 4607 The Museum and the Object (also ARTH 4107) (CA-AS) Fall. 4 credits. Prerequisites: History of Art majors only. 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 4621 The Multicultural Alhambra (also ARTH 4311, NES 4511) Spring. 4 credits. C. Robinson. For description, see ARTH 4311.

VISST 4625 Rasta, Race, and Resistance (also ARTH 4525, ASRC 4526) Fall. 4 credits. P. Archer-Straw. For description, see ARTH 4525.

VISST 4641 Comparative Modernities (also ARTH 4690/6690, COML 4910) # (CA-AS) Fall. 4 credits. I. Dadi. For description, see ARTH 4690.


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. S. Samuels. For description, see ENGL 4790.

VISST 5060 Contemporary African Diaspora Art (also ARTH 5505, ASRC 6500) Spring. 4 credits. C. Finley. For description, see ARTH 5505.

VISST 6174 Intro to Film Analysis (also FILM 2740/6740) Fall. 4 credits. D. Fredericksen. For description, see FILM 2740.

VISST 6466 Media Theory: Film and Photography (also GOVT 6665) Fall. 4 credits. Next offered 2009–2010. D. Rubenstein.

VISST 6619 Translation in Theory (also ASIAN 6619, COML 6610) Spring. 4 credits. Next offered 2009–2010. B. delbey. For description, see ASIAN 6619.

VISST 6625 Race, Gender, and Crossing Water (also ENGL 6650) Spring. 4 credits. Next offered 2010–2011. S. Samuels. For description, see ENGL 6650.

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.”

Abrahms, Meyer H., Ph.D., Harvard U. Class of 1916 Professor of English Emeritus, English
Abreu, Hector D., Ph.D., U. of North Carolina, Chapel Hill. Emile M. Chomat
Professor of Chemistry, Chemistry and Chemical Biology
Abusch, Dorit, Ph.D., U. of Massachusetts, Amherst. Assoc. 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. Emeritus, 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
Allaire, Elbern H., Ph.D., Cornell U. Sr Lect., 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

Altshuler, Glenn C., Ph.D., Cornell U. The Thomas and Dorothy Litwin Professor of American Studies, American Studies

Amphlett, Simon V., 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, Barbara Ann, Ph.D., Cornell U. Aaron L. Binenkorb Professor of International Studies Emeritus, Government

Anderson, Christopher J., Ph.D., Washington U. Prof., Government

Andrade, Li, Ph.D., Princeton U. Assoc. Prof., Earth and Atmospheric Sciences

Anker, Elizabth, Ph.D., U. of Virginia. Asst. Prof., English

Aracdi, Ace, 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

Arnesen, Ingrid, M.A., U. of California, Davis; M.A. SUNY Stony Brook. Sr. Lec., English for Academic Purposes

Arroyo, Ciriaco M., Ph.D., U. of Munich (Germany). Emerson-Hinchliff Prof.

Arutunian, Anisidinda, 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


Bailey, Graeme, Ph.D., U. of Birmingham. Prof., Computer Science

Baird, Barbara, Ph.D., Cornell U. Prof., Chemistry and Chemical Biology

Balda, 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. Prof., Romance Studies

Banerjee, Anindita, Ph.D., U. of California, Los Angeles. Assoc. Prof., Africana Studies

Bala, Kavita, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Computer Science

Barfield, Tim, Ph.D., Stanford U. Lec., English

Barber, Ross, Ph.D., New York U. Prof., History

Barker, Kenneth P., Ph.D., U. of California, Berkeley. Prof., Computer Science

Barker, Jonathan P. Ph.D., Harvard U. Prof., Emeritus, English

Barker, Jonathan P. Ph.D., Harvard U. Prof., Emeritus, English

Bartlett, Simon, Ph.D., U. of Chicago. Assoc. Prof., Mathematics

Bassett, William A., Ph.D., Columbia U. Prof., Emeritus, Earth and Atmospheric Sciences

Basu, Alaka, MSC, U. of London. Assoc. Prof., Sociology

Basu, Kaushik, Ph.D., London School of Economics (England). Carl Marks Prof. of International Studies, Economics

Bath, James, Ph.D., U. of Michigan. Prof., Philosophy

Bazhar, Ian, Ph.D., Far Eastern State U. (Russia). Asst. Prof., Physics/LEPP¶

Bean, Rachel E., Ph.D., Imperial College (England). Asst. Prof., Astronomy/CRSR®

Begley, Tadgh P., Ph.D., Calif. Inst. of Technology. Prof., Chemistry and Chemical Biology

Beker, Ayele, Ph.D., Temple U. Asst. Prof., Africana Studies and Research Center

Bell, James F., Ph.D., U. of Hawaii. Assoc. Prof., Astronomy/CRSR®

Benz, Daniel, Ph.D., U. of Michigan. Prof., Psychology

Bennett, Karen A., Ph.D., U. of Michigan. Assoc. Prof., Philosophy

Bennett, Karen A., Ph.D., U. of Michigan. Assoc. Prof., Philosophy

Bentley, Richard, Ph.D., Cornell U. Prof., Government

Berard, Jacques, Doctorat d'Univ., U. de 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. and H. Stanley Krusen Emeritus, Romance Studies/Comparative Literature

Berger, Anne, Ph.D., Paris VII (France). Prof., Romance Studies

Berkelman, Karl, Ph.D., Cornell U. Goldwin Smith Professor of Physics Emeritus, Physics/LASSP™


Beinart, Andrew, Ph.D., U. of Chicago. Assoc. Prof., History of Art

Bennett, Thomas and Dorothy Litwin Professor of American Studies, American Studies

Berndt, Richard, Ph.D., Cornell U. Prof., Human Ecology/Psychology

Bernstein, Sarah E., M.F.A., Yale U. Sr. Lec., Theatre, Film, and Dance

Bertozzi, Anna, Ph.D., U. of California, Los Angeles. Adj. Prof., Sociology

Bertozzi, Anna, Ph.D., U. of California, Los Angeles. Adj. Prof., Sociology

Bezhana, Olga, Ph.D., Yale U. Mellon Assistant Professor, Romance Studies

Bilotta, Louis J., Ph.D., City U. of New York. Prof., Mathematics


Birad, John, Ph.D., Rensselaer Polytechnic Inst. Prof. Emeritus, Earth and Atmospheric Sciences

Birch, John, Ph.D., Rensselaer Polytechnic Inst. Prof. Emeritus, Earth and Atmospheric Sciences

Birman, Kenneth P., Ph.D., U. of California, Berkeley. Prof., Computer Science

Bishopp, Jonathan P., Ph.D., Harvard U. Prof., Emeritus, English

Biskup, Marek, Ph.D., Catholic U. of Nijmegen. Assoc. Prof., Mathematics

Bjerken, Xak, D.M.A., Peabody Conservatory of Music. Assoc. Prof., Music

Blacker, Beverly, Ph.D., Cornell U. Sr. Lec., Africana Studies and Research Center

Black, Jean F., Ph.D., Harvard U. Emerita, English

Blackburn, Anne M., Ph.D., U. of Chicago. Assoc. Prof., Asian Studies

Blackshear, Rebecca, Ph.D., Cornell U. Sr. Lec., Africana Studies and Research Center

Bloom, Arthur L., Ph.D., Yale U. Prof., Emeritus, Earth and Atmospheric Sciences

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., History

Bock, David, Ph.D., SUNY Albany. Sr. Lec., Mathematics

Bodenschatz, Eberhard, Ph.D., U. of Bayreuth (Germany). Adj. Prof., Physics/LASSP™

Boettcher, Donna, M.D.A., U. of Iowa. Adj. Prof., Music

Bogel, Fredric V., Ph.D., Yale U. Prof., English

Bogel, Lynda Donelina, M.Phil., Yale U. Sr. Lec., English

Bosteels, Bruno, Ph.D., U. of Pennsylvania. Assoc. Prof. and H. Stanley Krusen Professor of World Religions, Asian Studies

Bowders, John S., Ph.D., Massachusetts Inst. of Technology. Asst. 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

Boyd, Richard N., Ph.D., Massachusetts Inst. of Technology. Prof., Philosophy/Science and Technology Studies

Boyer, Dominic, Ph.D., U. of Chicago. Assoc. Prof., History

Braddock, Jeremy, Ph.D., U. of Pennsylvania. Asst. Prof., English

Brady, Mary Pat, Ph.D., U. of California, Los Angeles. Assoc. Prof., English

Bramble, James H., Ph.D., U. of Maryland. Prof. Emeritus, Mathematics

Brann, Ross, Ph.D., New York U., Milton R. Konvitz Professor of Judeo-Islamic Studies, Near Eastern Studies

Brasshears, Matthew, Ph.D., U. of Arizona. Asst. Prof., Sociology

Brazell, Karen W., Ph.D., Columbia U. Prof., Emeritus, Japanese Literature, Asian Studies

Brennan, Todd, Ph.D., Princeton U. Prof., Philosophy

Briggs, Martina, M.A., O.M.O. Utrecht (The Netherlands). Sr. Lec., Germain Studies

Brittain, Charles F., Ph.D., Oxford U. (England). Prof., Classics/Philosophy

Bronfenbrenner, Urie, Ph.D., U. of Michigan. Jacob Gould Schurman Professor Emeritus, Human Ecology/Psychology

Brookhouse, Stephen Christopher, M.F.A., Virginia Tech. Sr. Lec., Theatre, Film, and Dance

Brouwer, Piet, Ph.D., Leiden U. Assoc. Prof., Physics/LASSP™

Brown, Kenneth S., Ph.D., Massachusetts Inst. of Technology. Prof., Mathematics

Brown, Larry D., Ph.D., Cornell U. Prof., Earth and Atmospheric Sciences/INSTOC®

Brown, Laura Ph.D., U. of California, Berkeley. John Wendell Anderson Professor of English

Browne, E. Wayles, Ph.D., U. of Zagreb (Croatia). Assoc. Prof., Linguistics

Brunner, Bonnie, Ph.D., Cornell U. Prof., German Studies

Bunce, Valerie, Ph.D., U. of Michigan. Aaron Binenkorb Professor of International Studies., Government
Burlitch, James M., Ph.D., Massachusetts Inst. of Technology. Prof. Emeritus, Chemistry and Chemical Biology

Burns, Joseph A., Ph.D., Cornell U. Irving Porter Church Professor of Engineering, Astronomy/Theoretical and Applied Mechanics/CISR

Byfield, Judith, Ph.D., Columbia U. Assoc. Prof., Africana Studies and Research Center

Caldwell, Steven B., Ph.D., Cornell U. Assoc. Prof., Sociology

Campbell, Deborah, M.A., Indiana U., Bloomington. Sr. Lec., English for Academic Purposes

Campbell, Donald B., Ph.D., Cornell U. Prof., Astronomy/NAIC

Campbell, Thomasy C., Ph.D., Columbia U. Assoc. Prof., Romance Studies

Cao, Xiaodong, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Mathematics

Carle, Patricia J., Ph.D., Columbia U. Prof., Russian

Cardie, Claire, Ph.D., U. of Massachusetts. Prof., Computer Science

Carlacio, Jami, Ph.D., U. of Wisconsin. Lec., English

Carlson, Allen, Ph.D., Yale U. Assoc. Prof., Government

Carmichael, Calum M., LL.D., Glasgow U. (Scotland). Prof., Comparative Literature/ Bible Studies

Caron, Vicki, Ph.D., Columbia U. Prof., Thomas and Diann Mann Chair in Modern Jewish Studies, History/Jewish Studies Program

Carpenter, Barry K., Ph.D., U. Coll., London (England). Horace White Professor Emeritus, Chemistry and Chemical Biology

Carroll, Noel, Ph.D., U. of Illinois. Assoc. Prof., Theatre/Philosophy

Case, Holly, Ph.D., Stanford U. Asst. Prof., History

Cassel, David G., Ph.D., Princeton U. Prof., Physics/LEPP

Cassel, Edith, Ph.D., U. of Heidelberg. Sr. Lec., Physics

Castillo, Debra, Ph.D., U. of Wisconsin, Milwaukee. Emerson-Hinchliff Prof., Romance Studies/Comparative Literature

Cathley, Luke, M. III, Ph.D., Princeton U. Prof., Earth and Atmospheric Sciences

Cerione, Richard, Ph.D., Rutgers U. Prof., English

Cather, Lawrence M., III, Ph.D., Princeton U. Emeritus, Economics

Chase, Cynthia, Ph.D., Yale U. Asst. Prof., English

Chen, Jian, Ph.D., South Illinois. Prof., The Michael J. Zak Chair of History for US-China Relations, History/China and Asia-Pacific Studies

Chen, Peng, Ph.D., Stanford U. Asst. Prof., Chemistry and Chemical Biology

Chen, Ulrich, Ph.D., U. of Cologne (Germany). Adj. Assoc. Prof., History

Chernoff, David F., Ph.D., U. of California, Berkeley. Prof., Astronomy/CISR

Chester, Geoffrey V., Ph.D. King’s Coll. London (England). Prof. Emeritus, Physics/LASSP

Cheyfitz, Eric, Ph.D., Johns Hopkins U. Prof., English

Chignell, Andrew, Ph.D., Yale U. Asst. Prof., Philosophy

Chirik, Paul J., Ph.D., California Inst. of Technology. Asst. Prof., Chemistry and Chemical Biology

Christiansen, Morten, Ph.D., U. of Edinburgh (Scotland). Assoc. Prof., Psychology

Chu, Junyau, B.A., U. of California, Berkeley. Lec., Theatre, Film, and Dance

Csone, John L., Ph.D., U. of Chicago. Prof., Earth and Atmospheric Sciences/INSTOC

Clinton, Kevin M., Ph.D., Johns Hopkins U. Prof., Classics

Coate, Stephen B., Ph.D., Northwestern U. Kiplinger Professor of Economic Policy, Economics

Coates, Geoffrey, Ph.D., Stanford U. Prof., Chemistry and Chemical Biology

Cochran, William, Ph.D., Yale U. Hushih Professor of History, History

Cohen, Itai, Ph.D., U. of Chicago. Asst. Prof., Physics/LASSP


Cohen, Walter I., Ph.D., U. of California, Berkeley. Prof., Comparative Literature/Romance Studies

Colin, Abigail C., Ph.D., U. of California, Los Angeles. Assoc. Prof., Linguistics

Colby-Hall, Alice M., Ph.D., Columbia U. Prof. Emerita, Romance Studies


Colman, David B., Ph.D., Columbia U. Prof., Chemistry and Chemical Biology

Colucci, Stephen J., Ph.D., SUNY Albany. Prof., Earth and Atmospheric Sciences

Connelly, Robert, Ph.D., U. of Michigan. Prof., Mathematics

Constable, Robert L., Ph.D., U. of Wisconsin. Prof., Computer Science

Cook, Kerry H., Ph.D., N. Carolina State U. Prof., Earth and Atmospheric Sciences

Cooke, W. Donald, Ph.D., U. of Pennsylvania. Prof. Emeritus, Chemistry and Chemical Biology

Cordes, James M., Ph.D., U. of California, San Diego. Prof., Astronomy/NAIC

Cornwell, Benjamin, Ph.D., U. of Chicago. Asst. Prof., Sociology

Corps, Duane J., Ph.D., New York U. Asst. Prof., History

Correll, Barbara, Ph.D., U. of Wisconsin. Assoc. Prof., English

Correll, Shelley, Ph.D., Stanford U. Asst. Prof., Sociology

Corson, Dale R., Ph.D., U. of California, Berkeley. Prof., Emeritus, Physics

Cotts, Robert M., Ph.D., U. of California, Berkeley. Prof. Emeritus, Physics/LASSP

Cowden, Jonathan, Ph.D., Yale U. Asst. Prof., Government

Craig, Raymond, Ph.D., Yale U. Assoc. Prof., History

Crane, Brian R., Ph.D., Scripps Research Inst.. Asst. Prof., Chemistry and Chemical Biology

Cross, Warren Dennis, B.A., SUNY Stony Brook. Sr. Lec., Theatre, Film, and Dance

Csaki, Csaba, Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Physics/LEPP

Culler, Jonathan D., Ph.D., Phll. Oxford U. (England). Class of 1916 Professor, English/Comparative Literature

Cutting, James E., Ph.D., Yale U. Prof., Psychology

Dadi, Iftikhar, Ph.D., Cornell U. Asst. Prof., Mathematics

Davis, H. Floyd, Ph.D., U. of California, Berkeley. Prof., Chemistry and Chemical Biology

Davis, J. C. Seamus, Ph.D., U. of California, Berkeley. Prof., Physics/LASSP

Davis, Stuart Arrowsmith, M.Phil., Yale U. Sr. Lec., English

Davis, Tom E., Ph.D., Johns Hopkins U. Prof. Emeritus, Economics

Dear, Peter R., Ph.D., Princeton U. Prof., History/Science and Technology Studies

DeGustano, Arthur T., Ph.D., Rutgers U. Prof., Earth and Atmospheric Science

de Bary, Brett, Ph.D., Harvard U. Prof., Asian Studies/Comparative Literature

Deinert, Herbert, Ph.D., Yale U. Prof. Emeritus, Comparative Literature

DeLoughrey, Elizabeth, Ph.D., U. of Maryland. Assoc. Prof., English

Dennis, R. Keith, Ph.D., Rice U. Prof., Mathematics

Derry, Louis A., Ph.D., Harvard U. Prof., Mathematics

DeVoogd, Timothy J., Ph.D., U. of Illinois. Prof., Psychology

Dickel, William R., Ph.D., U. of California, Berkeley. Asst. Prof., Chemistry and Chemical Biology

Diersing, Molly, Ph.D., U. of Massachusetts, Amherst. Prof., Linguistics

Dingle, Gregory, Ph.D., North Carolina State U. Adj. Asst. Prof., Earth and Atmospheric Sciences

DiSalvo, Francis J. Jr., Ph.D., Stanford U. John A. Newman Professor of Physical Science, Chemistry and Chemical Biology

Divo-Hoare, Stephanie Alison, Ph.D., Cornell U. Sr. Lec., Asian Studies

Donaldson, Laura, Ph.D., Emory U. Prof., English

Dubreuil, Laurent, Ph.D., Université Paris VIII. Assoc. Prof., Romance Studies

Dugan, Gural F., Ph.D., Columbia U. Prof., Physics/LEPP

Dunning, David, Ph.D., Stanford U. Prof., Psychology

Durrett, Richard T., Ph.D., Stanford U. Prof., Mathematics

Dyukin, Eugene B., Dr. of Sci., Moscow U. (Russia). Abram R. Bullis Professor of Mathematics

Ealick, Steven, Ph.D., U. of Oklahoma. Prof., Chemistry and Chemical Biology

Earle, Clifford J., Ph.D., Harvard U. Prof. Emeritus, Mathematics

Easley, David, Ph.D., Northwestern U. Henry Scarborough Prof. of Social Sciences, Economics

Eddy, Donald D., Ph.D., U. of Chicago. Prof. Emeritus, English

Edelman, Shain, Ph.D., Weizmann Inst. of Science (Israel). Prof., Psychology

Edmondson, Locksley G., Ph.D., Queens U. (Canada). Prof., Africana Studies and Research Center

Ehrenberg, Ronald, Ph.D., Northwestern U. Prof., Industrial and Labor Relations/ Economics

Ekland, Matti, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Philosophy


Elías, Robert, Ph.D., U. of Pennsylvania. Goldwin Smith Professor of English Literature and American Studies, Emeritus, English
Elser, Veit, Ph.D., U. of California, Berkeley. Prof., Physics/LASSP
Enns, Peter, Ph.D., U. of North Carolina. Asst. Prof., Government
Ernste, Kevin, D.M.A., Eastman School of Music. Prof., Music
Esman, Milton J., Ph.D., Princeton U. John S. Knight Professor of International Studies, Emeritus, Government
Evangelista, Matthew, Ph.D., Cornell U. Prof., Geography of Psychology
Ezra, Gregory S., Ph.D., Oxford U. (England). Prof., Chemistry and Chemical Biology
Fajnzylber, Stanley, Ph.D., Stanford U. Assoc. Prof., Anthropology
Falk, Oren, Ph.D., U. of Toronto (Canada). Asst. Prof., History
Fallon, Louis, M.A., Harvard U. Sr. Lec., Romance Studies
Fallman de Paz-Soldan, Tamra, M.A., Columbia U. Lect., Romance Studies
Fan, K-Y Daisy, Ph.D., Cornell U. Lec., Computer Science
Farrell, Grant A., Ph.D., Princeton U. Prof., Africana Studies and Research Center
Farrell, Roger H., Ph.D., U. of Illinois. Prof. Emeritus, Mathematics
Faulkner, David A., M.A., Princeton U. Sr. Lect., English
Fawcett, Jane, Ph.D., Stanford U. Assoc. Prof., Philosophy
Fay, Robert C., Ph.D., U. of Illinois. Prof. Emeritus, Chemistry and Chemical Biology
Feeny, Timothy, D.M.A., Yale U. Lec., Music
Fieldshu, David, Ph.D., U. of Minnesota. Prof., Theatre, Film and Dance
Ferguson, Elena E., Ph.D., New York U. Asst. Prof., Psychology
Fein, Fernández, María, Ph.D., Columbia U. Asst. Prof., History of Art
Field, David J., Ph.D., U. of Pennsylvania. Assoc. Prof., Psychology
Fine, Gail J., Ph.D., Harvard U. Prof., Philosophy/Classics
Finlay, Barbara L., Ph.D., Massachusetts Inst. of Technology. William R. Kenan, Jr. Prof. Emeritus
Finley, Cheryl Ph.D., Yale U. Asst. Prof., History of Art
Fiskejo, Magnus Ph.D., U. of Chicago. Asst. Prof., Anthropology
Flanagan, Eanna E., Ph.D., California Inst. of Technology. Prof., Physics/Astronomy/LEPP
Fogelkanger, Allen L., Ph.D., Cornell U. Sr. Lec., Theatre, Film and Dance
Fontaine, Michael P., Ph.D., Brown U. Asst. Prof., Classics
Fortune, Joanne E., Ph.D., Cornell U. James Law Professor of Psychology/Feminist, Gender, & Sexuality Studies
Frank, Jason, Ph.D., Johns Hopkins U. Gary S. Davis Asst. Professorship of the History of Political Thought, Government
Frederickson, Donald L., Ph.D., U. of Iowa. Prof., Theatre, Film and Dance
Freed, Jack H., Ph.D., Columbia U. Prof., Chemistry and Chemical Biology
Fried, Sibra, Ph.D., Yale U. Assoc. Prof., English
Fulbright, Robert Ph.D., U. of Michigan. Sr. Lec., Physics
Fulton, Alice, MFA, Cornell U. Ann S. Bowers Professor of English
Furman, Nelly, Ph.D., Columbia U. Prof. Emerita, Romance Studies
Gainor, Ellen J., Ph.D., Princeton U. Prof., Theatre, Film, and Dance
Gair, James W., Ph.D., Cornell U. Emeritus
Galik, Richard S., Ph.D., Cornell U. Prof., Physics/LEPP
Galloway, Andrew, Ph.D., U. of California, Berkeley. Professor of English
Ganem, Bruce, Ph.D., U. of Chicago and Elizabeth Roessler Professor of Chemistry and Chemical Biology
Garcés, María Antonia, Ph.D., Johns Hopkins U. Assoc. Prof., Romance Studies
Garcia, Maria Cristina, Ph.D., U. of Texas. Austin. Prof., History/Latin Studies
Gehrke, Johannes, Ph.D., U. of Wisconsin. Madison. Assoc. Prof., Computer Science
Ghosh, Durla, Ph.D., U. of California, Berkeley. Assoc. Prof., History
Giambattista, Alan G., M.S., Cornell U. Sr. Lec., Physics
Gibbons, Lawrence K., Ph.D., U. of Chicago. Assoc. Prof., Physics/LEPP
Gibson, Eleanor J., Ph.D., Yale U. Susan Linn Sage Professor of Psychology Emeritus, Psychology
Giersch, Peter J., Ph.D., Harvard U. Prof., Astronomy/CRSR
Gilbert, Roger S., Ph.D., Yale U. Prof., English
Gilgen, Peter, Ph.D., Stanford U. Assoc. Prof., German Studies
Gilliland, Mary, M.A., Cornell U. Sr. Lec., Knight Institute for Writing in the Disciplines
Gilibuchi, Thomas Ph.D., Stanford U. Asst. Prof., Psychology
Ginet, Carl A., Ph.D., Cornell U. Prof. Emeritus, Philosophy
Ginsparg, Paul, Ph.D., Cornell U. Prof., Physics/CIS
Giovannelli, Riccardo, Ph.D., Indiana U. Prof., Astronomy/NAIC
Gleach, Frederic, Ph.D., Stanford Sr. Lec., Anthropology
Goesert, Kent, M.F.A., U. of Wisconsin, Madison. Prof., Theatre, Film and Dance
Gold, Daniel, Ph.D., U. of Chicago Divinity School Prof., Asian Studies
Goldsmith, Paul F., Ph.D., U. of California. Prof., Psychology
Golch, Michael, Ph.D., Indiana U. Asst. Prof., Psychology
Gottfried, Kurt, Ph.D., Massachusetts Inst. of Technology. Prof. Emeritus, Physics/LEPP
Gottschalk, Katherine Kibliger, Ph.D., U. of Chicago. Sr. Lec., English and Knight Institute for Writing in the Disciplines
Greenberg, Donald P., Ph.D., Cornell U. Prof., Computer Science
Goldstein, Michael, Ph.D., Indiana U. Asst. Prof., Psychology
Grooss, Arthur, Ph.D., Cornell U. Prof., German Studies and Music
Grooss, Leonard, Ph.D., U. of Chicago. Prof., Mathematics
Grossvogel, Anita V., Ph.D., Cornell U. Assoc. Prof. Emerita, Romance Studies
Gruen, Sol M., Ph.D., Princeton U. Prof., Emeritus, Goldwin Smith Professor of Romance Studies and Comparative Literature
Grunder, John, Ph.D., U. of California. Berkeley. Prof., Mathematics
Guerreri, John, Ph.D., U. of California. Berkeley. Prof., Anthropology
Haenni, Sabine, Ph.D., U. of Chicago. Asst. Prof., Theatre, Film and Dance/ American Studies
Haines-Eitzen, John, B.M., U. of Indiana. Sr. Lec., Music
Hall, Daniel Crawford, M.F.A., U. of Iowa. Sr. Lec., Theatre, Film and Dance
Halpern, Bruce P., Ph.D., Brown U. Susan Linn Sage Professor of Psychology, Psychology/ Biological Sciences
Halpern, Joseph Y., Ph.D., Harvard U. Prof., Computer Science
Hammers, Gordon G., Ph.D., U. of Wisconsin. Horace White Prof. Emeritus, Chemistry and Chemical Biology
Hand, Louis N., Ph.D., Stanford U. Prof., Physics/LEPP
Hanson, Ellis, Ph.D., Princeton U. Prof., English
Harbert, Wayne E., Ph.D., U. of Illinois. Prof., Film and Television Studies
Harris, David, Ph.D., Northwestern U. Prof., Sociology
Harris, Robert L., Ph.D., Northwestern U. Prof., Africana Studies and Research Center
Harrison-Watson, Rebecca, D.M.A., Stanford U. Prof., Music
Hartill, Donald L., Ph.D., California Inst. of Technology. Prof., Physics/LEPP
Hartmanis, Juris, Ph.D., California Inst. of Technology. Prof., Engineering Emeritus, Computer Science
Harwit, Martin O., Ph.D., Massachusetts Inst. of Technology. Prof. Emeritus, Astronomy/CRSR
Hassan, Salah M., Ph.D., U. of Pennsylvania. Prof., Africana Studies and Research Center/Adj. Prof., History of Art
Hatch, Martin, Ph.D., Cornell U. Assoc. Prof., Music
Hatcher, Allen, Ph.D., Stanford U. Prof., Mathematics
Hay, George A., Ph.D., Northwestern U. Prof., Economics/Edward Cornell Prof. of Law
Hayes, Donald P., Ph.D., U. of Washington. Prof. Emeritus, Sociology
Haynes, Martha Ph.D., Indiana U. Goldwin Smith Professor of Astronomy/NAIC
Heckathorn, Douglas D., Ph.D., U. of Kansas. Prof., Sociology
Henderson, David W., Ph.D., U. of Wisconsin. Prof., Mathematics
Henderson, John S., Ph.D., Yale U. Prof., Anthropology
Hendrix, Burke, Ph.D., U. of Colorado. Asst. Prof., Government
Henley, Christopher L., Ph.D., Harvard U. Prof., Physics/LAPSE
Herrin, W. Lamar, Ph.D., U. of Cincinnati. Prof., Emeritus, English
Herring, Ronald, Ph.D., U. of Wisconsin, Madison. Prof., Government
Herter, Terry L., Ph.D., U. of Rochester. Prof., Astronomy/CBSR
Hertzberg, Samuel, Ph.D., Cornell U. Adjunct Prof., Linguistics
Hildebrand, George H., Ph.D., Cornell U. Maxwell M. Unson Professor of Economics and Industrial Relations Emeritus, Economics/Industrial and Labor Relations
Hilgartner, Stephen, Ph.D., Cornell U. Assoc. Prof., Science and Technology Studies
Hill, Thompos D., Ph.D., Cornell U. Prof., English/Medieval Studies
Hines, Melissa A., Ph.D., Stanford U. Prof., Chemistry and Chemical Biology
Hirneis, T. J., Ph.D., Harvard U. Asst. Prof., History
Hirano, Katsuya, Ph.D., Chicago U. Asst. Prof., History
Hirsh, Elizabeth, Ph.D., U. of Washington. Asst. Prof., Sociology
Hite, Molly, Ph.D., U. of Washington. Prof., English
Hjortshøj, Keith Guy, Ph.D., Cornell U. Sr. Lec., Knight Institute for Writing in the Disciplines
Hodes, Harold, Ph.D., Harvard U. Assoc. Prof., Philosophy
Hoffmann, Roald, Ph.D., Harvard U. Frank H. T. Rhodes Professor of Humane Letters, Emeritus, Chemistry and Chemical Biology
Hoffstaetter, Georg, Ph.D., Michigan State U. Assoc. Prof., Physics/LEPP
Hogg, Nelson, Ph.D., Massachusetts Institute of Technology. Adj. Prof., Earth and Atmospheric Sciences
Hohendahl, Peter U., Ph.D., Hamburg U. (Germany). Jacob Gould Schurman Professor of German Literature, German Studies/Comparative Literature
Holcomb, Donald F., Ph.D., U. of Illinois. Prof., Emeritus, Physics/LAPSE
Holdheim, W. Wolfgang, Ph.D., Yale U. Frederic J. Whinton Professor of Liberal Studies, Emeritus, Comparative Literature/Romance Studies
Holm, Tara, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Mathematics
Holmberg, David H., Ph.D., Cornell U. Prof., Anthropology/Feminist, Gender, & Sexuality Studies
Holst-Warhaft, Gail, Ph.D., Cornell U. Adj. Prof., Comparative Literature
Hong, Yongmiao, Ph.D., U. of California, San Diego. Assoc. Prof., Economics
Hopcroft, John E., Ph.D., Stanford U. IBM Prof. of Engineering and Applied Mathematics, Computer Science
Horne, Luz, Ph.D., Yale U. Asst. Prof., Romance Studies
Hosea, Chrissy, M.A. equivalent, Vrije U. (Amsterdam). Lec., German Studies
Houck, James R., Ph.D., Cornell U. Kenneth A. Wallace Professor of Astronomy/CBSR
Houstoun, Paul L., Ph.D., Massachusetts Inst. of Technology. Peter J. W. Debye Professor of Chemistry and Chemical Biology
Howie, Cary S., Ph.D., Stanford U. Asst. Prof., Romance Studies
Hsi, John T. H., Ph.D., Music, New England Conservatory of Music. Old Dominion Foundation Professor Emeritus of Humanities and Music
Huang, Hong, M.A., City Coll. of New York. Sr. Lec., Asian Studies
Hubbard, John H., Doctorat d'Etat, U. of Paris (France). Emeritus, Economics
Hughes, Robert E., Ph.D., Cornell U. Prof., Emeritus, Chemistry and Chemical Biology
Hull, Isabel V., Ph.D., Yale U. John Stambaugh Professor of History, History
Husa, kamali, Diploma, Paris Conservatory (France). Kapka Alpha Professor Emeritus of Music
Huttenlocher, Daniel P., Ph.D., Massachusetts Inst. of Technology. Prof., Computer Science
Hwang, J. T. Gene, Ph.D., Purdue U. Prof., Mathematics
Ihms, Paul R., D. Phil., Oxford U. (UK). Prof., History
Hyssell, David L., Ph.D., Cornell U. Prof., Earth and Atmospheric Sciences
Ichikawa, Satoko, Ph.D., U.S.C. Lec., German Studies
Ilyashenko, Yulij, Ph.D., Moscow State U. (Russia). Prof., Mathematics
Intemann, Edward David, M.F.A., Cornell U. Sr. Lec., Theatre, Film, and Dance
Irwin, Terence H., Ph.D., Princeton U. Susan Linn Sage Professor of Philosophy, Philosophy/Classics
Isacks, Bryan L., Ph.D., Columbia U. William and Katherine Snee Prof., Emeritus, Earth and Atmospheric Sciences
Isard, Walter, Ph.D., Harvard U. Prof. Emeritus, Economics
Isbell, Billie J., Ph.D., U. of Illinois. Prof., Emeritus, Anthropology
Ison, Alice M., Ph.D., Stanford U. Prof., Johnson Graduate School of Management/Psychology
Jagacinski, Ngampit, Ph.D., Ohio State U. Sr. Lec., Asian Studies
James, Doug L., Ph.D., U. of British Columbia. Assoc. Prof., Computer Science
Janczewska, Holland, M.M.A., Yale U. Lec., Music
Janowitz, Phyllis, M.F.A., U. of Massachusetts. Prof., English
Joachims, Thorsten, Ph.D., U. of Dortmund (Germany). Assoc. Prof., Computer Science
John, James J., Ph.D., U. of Notre Dame. Professor Emeritus, History
Johnston, Robert E., Ph.D., Rockefeller U. Prof., Psychology
Jones, Wendy D., Cornell U. Sr. Lec., English
Jones-Correia, Michael, Ph.D., Princeton U. Prof., Government
Jordan, Kurt, Ph.D., Columbia U. Asst. Prof., Anthropology
Jordan, Teresa E., Ph.D., Stanford U. Prof., Earth and Atmospheric Sciences/INSTOC
Jordaan, Eliza H., Ph.D., Yale U. Mary Donlon Alger Professor of Linguistics Emerita, Modern Languages and Linguistics
Kahn, Alfred E., Ph.D., Yale U. Robert Julius Thorne Professor of Political Economy Emeritus, Economics
Kahn, Peter J., Ph.D., Princeton U. Prof., Mathematics
Kalas, Rayna, Ph.D., U. of Pennsylvania. Assoc. Prof., English
Kamm, Michael G., Ph.D., Harvard U. Newton C. Farr Professor Emeritus of American History and Culture, History
Kanbur, Ravi, Ph.D., Oxford U. (England) T.H. Lee Prof. of World Affairs, Economics
Kanematsu, Janice, Ph.D., U. of California, Berkeley. Asst. Prof., Asian Studies
Kaplan, Steven L., Ph.D., Yale U. Goldwin Smith Professor of History, History
Kari, Daniel E., Ph.D., U. of California, San Diego. Prof. Emeritus, Earth and Atmospheric Sciences
Kaske, Carol V., Ph.D., Johns Hopkins Prof. Emerita, English
Kassabov, Martin, Ph.D, Yale U. Asst. Prof., Mathematics
Katzenstein, Mary F. Ph.D., Massachusetts Inst. of Technology. Stephen and Evelyn Milman Professor of American Studies, Government
Katzenstein, Peter J., Ph.D., Harvard U. Walter S. Carpenter, Jr. Professor of International Studies, Government
Kaye, Ronald W., Ph.D., Columbia U. Prof., Earth and Atmospheric Sciences/INSTOC
Kay, Suzanne Mahlburg, Ph.D., Brown U. Prof., Earth and Atmospheric Sciences/INSTOC
Keich, Uri, Ph.D., Courant Inst. Asst. Prof., Computer Science
Keller, Patricia, Ph.D., U Michigan. Asst. Prof. Romance Studies
Kelley, E. Wood, Ph.D., Indiana U. Assoc. Prof., Government
Kelley, Michael C., Ph.D., U. of California, Berkeley. Prof., Earth and Atmospheric Sciences/Electrical and Computer Engineering
Kellogg, Judith M.M., Boston U. Assoc. Prof., Music
Kennedy, William J., Ph.D., Yale U. Prof., Comparative Literature
Keshvani, Harriet K., Ph.D., Cornell U. Emeritus, Mathematics
Khovanskii, Bakhadyr, Ph.D., Novosibirsk U. (Russia). Adj. Prof., Mathematics
Kiefer, Nicholas M., Ph.D., Princeton U. Tai-Chung Liu Prof. of Economics
Kim, Chris Y., M.M., U. of Michigan, Ann Arbor. Asst. Prof., Music
Kinosita, Toshihiro, Ph.D., Tokyo U. (Japan). Goldwin Smith Professor of Physics Emeritus/LEPP
Kirshner, Jonathan, Ph.D., Princeton U. Prof., Government
Klein, Richard J., Ph.D., Yale U. Prof., Romance Studies
Kleinberg, John, Ph.D., Massachusetts Inst. of Technology. Prof., Computer Science
Kleinberg, Robert, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Computer Science
Kline, Ronald, Ph.D., U. of Wisconsin. Sue G. and Harry E. Boyov Jr. Professor of History and Ethics of Engineering, Science and Technology Studies
Knapp, Warren W., Ph.D., U. of Wisconsin. Prof. Emeritus, Earth and Atmospheric Sciences
Koch, Christoph, Ph.D., T. U. Vienna. Assoc. Prof., Computer Science
Koch, Michael, M.F.A., Wichita State U. Sr. Lec., English
Kosch, Michelle, Ph.D, Columbia U. Assoc. Prof., Philosophy
Koschmann, J. Victor, Ph.D., Cornell U. Assoc. Prof., Philosophy
Kowar, Janice Sue, B.S., U. of Illinois. Sr. Lec., Theatre, Film and Dance
Kozen, Dexter, Ph.D., Cornell U. Joseph N. Kanematsu Professor of Science and Technology Studies, Emeritus, Physics/LAPSE
Kozen, Yoon刚开始...
Rosenberg, Edgar, Ph.D., Stanford U. Prof., Emeritus of English/Comparative Literature
Rossiter, Margaret, Ph.D., Yale U. Marie Underhill Noll Professor of the History of Science, Science and Technology Studies
Rubenstein, Diane, Ph.D., Yale U. Prof., Government
Rubin, David L., Ph.D., U. of Michigan. Boyce D. McDaniel Prof. of Physics, Physics/LASSP
Ruff, Carin, Ph.D., U. of Toronto. Asst. Prof., English/Medieval Studies
Ruppel, Antonio, Ph.D., Cambridge U. Townsend Lecturer of Greek, Latin and Sanskrit, Classics
Rush, Myron, Ph.D., U. of Chicago. Prof. Emeritus, Government
Rusk, Bina, Ph.D., U. of California, Los Angeles. Asst. Prof., Asian Studies
Russo, James, Jr., Ph.D., Harvard U. Prof., Romance Studies
Russell, Nerissa, Ph.D., U. of California, Berkeley. Assoc. Prof., Anthropology
Rusten, Jeffrey S., Ph.D., Harvard U. Prof., Classics
Ryd, Anders, Ph.D., U. of California, Santa Barbara. Asst. Prof., Physics/LASSP
Sacchetti, Neil, Ph.D., Johns Hopkins U. Assoc. Prof., English/Comparative Literature
Sadics, Aaron, Ph.D., Yale U. Asst. Prof., History
Salci, Naoki, Ph.D., U. of Chicago. Prof., Asian Studies/Comparative Literature
Saloff-Coste, Laurent, Ph.D., U. of Paris VI (France). Prof., Mathematics
Salpeker, Edwin E., Ph.D., Birmingham U. (England). James Gilbert White Distinguished Professor in the Physical Sciences/Biology/Physics/LASSP/Astronomy/CRSRI
Salvato, Nicholas, Ph.D., Yale U. Asst. Prof., Theatre, Film, and Dance
Salvatore, Nicholas, Ph.D., U. of California, Berkeley. Prof., Industrial and Labor Relations/American Studies
Samuels, Shirley, Ph.D., U. of California, Berkeley. Prof., English/History of Art
Sanchez, Arturo Ignacio, Ph.D., Columbia U. Asst. Prof., Latino Studies/City and Regional Planning
Sanchez-Blake, Elvira, Ph.D., Cornell U. Sr. Lect., Romance Studies
Sanders, Elizabeth, Ph.D., Cornell U. Prof., Government
Sangren, P. Steven, Ph.D., Stanford U. Prof., Anthropology
Santiago-Irizarry, Vilma, Ph.D., New York U. Asst. Prof., Romance Studies
Sanchez, Arturo Ignacio, Ph.D., Columbia U. Asst. Prof., Latin American and Caribbean Studies/Comparative Literature
Santacruz, Jenn, Ph.D., Washington State U. Prof., Earth and Atmospheric Sciences
Satcher, Paul L., Ph.D., Columbia U., English
Sayers, William J., Ph.D., U. of California, Berkeley. Adj. Prof., Comparative Literature
Scharr, Nava, M.A., Levinsky Seminary, Tel Aviv (Israel). Sr. Lect., Near Eastern Studies
Schatz, Alfred H., Ph.D., New York U. Prof., Mathematics
Schefer, Richard R., Ph.D., Columbia U. Prof., Near Eastern Studies
Schoen, Johanna, Ph.D., U. of Chicago. Sr. Lect., Anthropology
Schulze, Richard E., Ph.D., Brown U. Prof., Emeritus, Economics/Engineering
Schwarz, Jeffrey, Ph.D., U. of California, Berkeley. Assoc. Prof., Physics/LASSP
Schwarz, Anette, Ph.D., Johns Hopkins U. Fredric J. Whiton Professor of German Studies
Schwarz, Daniel R., Ph.D., Brown U. Fredric J. Whiton Professor of English, English
Segal, Harry, Ph.D., U. of Michigan. Sr. Lect., Romance Studies
Selby, Katherine, Ph.D., U. of California, Berkeley. Sr. Lect., Physics
Self, James T., B.A., Cornell U. Sr. Lect., Theatre, Film, and Dance
Selman, Ely, Ph.D., U. of Toronto (Canada). Prof., Computer Science
Sem, Shankar, Ph.D., Harvard U. Prof., Mathematics
Senderovich, Saveliy, Ph.D., New York U. Prof., Linguistics
Sengoku, Fumio, Ph.D., Carnegie–Mellon U. Asst. Prof., Science and Technology Studies/Computing and Information Science
Seth, Suman, Ph.D., Princeton U. Prof., Science and Technology Studies
Sethi, Neelam, Ph.D., U. of California, San Diego. Lect., Philosophy
Sethna, James P., Ph.D., Princeton U. Prof., Physics/LASSP
Sezneć, Alain D. E.S., U. of Paris–Sorbonne (France). Prof. Emeritus, Romance Studies
Shao, Weng Teng, M.A., Tsinghua U. (China). Lect., Asian Studies
Shapiro, Elliot Hart, Ph.D., U. of Rochester. Knight Institute for Writing in the Disciplines
Shapiro, Gabriel, Ph.D., U. of Illinois, Urbana–Champaign. Prof. Russian
Shay, Harry E., Ph.D., U. of California, Berkeley. Prof., English
Shelter, Martin A., Ph.D., Harvard U. Prof., Government
Shell, Karl, Ph.D., Stanford U. Robert Julius Thorne Professor of Economics
Shen, Kyle M., Ph.D., Stanford U. Asst. Prof., Physics/LASSP
Shin, Michael, Ph.D., U. of Chicago. Asst. Prof., Asian Studies
Shmyo, David B., Ph.D., U. of California, Berkeley. Prof., Computer Science
Shoemaker, Sydney S., Ph.D., Cornell U. Professor Emeritus, Philosophy
Shore, Richard A., Ph.D., Massachusetts Inst. of Technology. Prof., Mathematics
Shue, Henry, Ph.D., Princeton U. Wyn and William Y. Hutchinson Prof. of Ethics and Public Life
Siegel, James T., Ph.D., U. of California, Berkeley. Prof. Emeritus, Anthropology
Siegel, Sandra F., Ph.D., U. of Chicago. Prof. Emerita, English
Sierra, Roberto, M.M., London U. (England). Old Dominion Foundation Professor in the Humanities, Music
Sievers, Albert J. III, Ph.D., U. of California, Berkeley. Edward L. Nichols Professor, Physics/LASSP
Sigga, Eric, Ph.D., Harvard U. Adj. Prof., Physics/LASSP
Silver, Joel H., Ph.D., U. of Iowa. President White Professor of American History
Silver, Kenneth I. Jr., Prof., Economics
Silins, Nicholas, Ph.D., Oxford U. Asst. Prof., Philosophy
Silvbee, Robert H., Ph.D., Harvard U. Prof., Emeritus, Physics/LASSP
<table>
<thead>
<tr>
<th>Name</th>
<th>Degree(s)</th>
<th>Institution</th>
<th>Position/Year</th>
<th>Department/Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swedler, M. E.</td>
<td>Ph.D., Massachusetts Inst.</td>
<td>Technology</td>
<td>Prof Emeritus</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Szabó, Zoltán</td>
<td>Ph.D., Massachusetts Inst.</td>
<td>Technology</td>
<td>Assoc. Prof.</td>
<td>Philosophy</td>
</tr>
<tr>
<td>Taivala, Kristin</td>
<td>Ph.D., Eastern School of Music</td>
<td>Assoc. Prof.</td>
<td>Philosophy</td>
<td></td>
</tr>
<tr>
<td>Tardos, Ervin</td>
<td>Ph.D., (Hungary)</td>
<td>Assoc. Prof.</td>
<td>Computer Science</td>
<td></td>
</tr>
<tr>
<td>Taylor, Susan</td>
<td>Ph.D., Cornell U. Adjunct</td>
<td>Assoc. Prof.</td>
<td>Romance Studies</td>
<td></td>
</tr>
<tr>
<td>Taylor, Sidney</td>
<td>Ph.D., U. of California</td>
<td>Assoc. Prof.</td>
<td>History</td>
<td></td>
</tr>
<tr>
<td>Taylor, Erin</td>
<td>Ph.D., U. of California</td>
<td>Assoc. Prof.</td>
<td>Philosophy</td>
<td></td>
</tr>
<tr>
<td>Terrell, Robert</td>
<td>Ph.D., U. of Virginia</td>
<td>Sr. Lec.</td>
<td>Mathematics</td>
<td></td>
</tr>
<tr>
<td>Terrell, Maria Sheba</td>
<td>Ph.D., U. of Virginia</td>
<td>Sr. Lec.</td>
<td>Sociology</td>
<td></td>
</tr>
<tr>
<td>Thorne, Robert</td>
<td>Ph.D., U. of Illinois</td>
<td>Assoc. Prof.</td>
<td>Physics/LASSP*</td>
<td></td>
</tr>
<tr>
<td>Thorbecke, Erik</td>
<td>Ph.D., U. of California</td>
<td>Berkeley</td>
<td>Economics</td>
<td></td>
</tr>
<tr>
<td>Thom, Julia</td>
<td>Ph.D., U. of Hamburg (Germany)</td>
<td>Asst. Prof.</td>
<td>Astronomy</td>
<td></td>
</tr>
<tr>
<td>Thom, Robert</td>
<td>Ph.D., U. of Illinois</td>
<td>Prof.</td>
<td>Philosophy</td>
<td></td>
</tr>
<tr>
<td>Tierney, Brian</td>
<td>Ph.D., Pembroke Coll.</td>
<td>Asst. Prof.</td>
<td>Computer Science</td>
<td></td>
</tr>
<tr>
<td>Tierney, Pamela</td>
<td>Ph.D., California, U. Los Angeles</td>
<td>Assoc. Prof.</td>
<td>Physics/LASSP*</td>
<td></td>
</tr>
<tr>
<td>Thijssen, Erik</td>
<td>Ph.D., U. of California</td>
<td>Berkeley</td>
<td>Philosophy</td>
<td></td>
</tr>
<tr>
<td>Tomás Bevila</td>
<td>M.A., U. of Nevada, Reno</td>
<td>Sr. Lec.</td>
<td>Romance Studies</td>
<td></td>
</tr>
<tr>
<td>Törnroos, Shawkat</td>
<td>Ph.D., U. of Pennsylvania</td>
<td>Assoc. Prof.</td>
<td>Philosophy</td>
<td></td>
</tr>
<tr>
<td>Tranvét, Thuy</td>
<td>M.A., U. of Michigan</td>
<td>Assoc. Prof.</td>
<td>Romance Studies</td>
<td></td>
</tr>
<tr>
<td>Travers, T. Robert</td>
<td>Ph.D., Gonville and Caus Coll.</td>
<td>Assoc. Prof.</td>
<td>History</td>
<td></td>
</tr>
<tr>
<td>Tsimerov, Viktoria</td>
<td>M.S., Lsensovet Leningrad Inst.</td>
<td>Assoc. Prof.</td>
<td>Chemistry (Russia)</td>
<td></td>
</tr>
<tr>
<td>Tynenrekov, Viktor</td>
<td>Ph.D., New York U. Asst. Prof.</td>
<td>Assoc. Prof.</td>
<td>Economics</td>
<td></td>
</tr>
<tr>
<td>Tucker, Scott</td>
<td>M.M., New England Conservatory</td>
<td>Assoc. Prof.</td>
<td>Music</td>
<td></td>
</tr>
<tr>
<td>Tun, San San Hnin</td>
<td>Ph.D., U. of Nottingham (England)</td>
<td>Sr. Lec.</td>
<td>Romance Studies</td>
<td></td>
</tr>
<tr>
<td>Turcotte, Donald</td>
<td>Ph.D., California Inst. of Technology</td>
<td>Prof Emeritus, Earth and Atmospheric Sciences</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Silverman, Albert, Ph.D., U. of California
Berkeley, Prof Emeritus, Physics/LEPP
Singh, Sujita, B.A., Kashi Vidyapeeth U. (India). Lec, Asian Studies
Sirer, Emin Gun, Ph.D., U. of Washington.
Astronomy/Physics/CRSR†
Sjamaar, Reyer, Ph.D., Rijksuniversiteit te Utrecht (The Netherlands). Assoc. Prof.
Mathematics
Small, Meredith F., Ph.D., U. of California, Davis. Prof. Anthropology
Smillie, John, Ph.D., U. of Chicago. Prof., Philosophy
Mathematics
Smith, Anna Marie, Ph.D., U. of Essex (England). Prof., Government
Smith, Daniel M., U. of Illinois. Asst. Prof., Sociology
Smith, Robert J., Ph.D., Cornell U. Golden
Smith Professor of Anthropology Emeritus
Sogah, Dotsevi Y., Ph.D., U. of California, Los Angeles. Asst. Prof., Philosophy
Smith, Robert, Ph.D., Vanderbilt U. Prof., History
Smith, Peter C., Ph.D., Massachusetts Inst. of Technology. Prof., Physics/LEPP
Stern, Robert, Ph.D., Vanderbilt U. Prof., Sociology/Industrial and Labor Relations
Stillman, Michael E., Ph.D., Harvard U. Prof., History
Stith, Marice W., M.A., Ohio State U. Prof.
Economics
Strange, David, Ph.D., Stanford U. Prof., Sociology
Stratakos Tío, Amália, M.S., Syracuse U. Sr. Lec., Romance Studies
Strauss, Barry S., Ph.D., Yale U. Prof., History/Classics
Strickland, Robert S., Ph.D., Princeton U. Prof., Mathematics
Strout, S. Cushing, Jr., Ph.D., Harvard U. Ernest W. Professor of American Studies and Humane Letters, Emeritus, English
Stucky, Steven, D.M.A., Cornell U. Given Foundation Professor of Music
Sturgeon, Nicholas L., Ph.D., Princeton U. Prof., Philosophy
Suher, Paul Byron, B.A., Cornell U. Sr. Lec., Theatre, Film and Dance
Sukle, Robert Joseph, M.A., Cornell U. Prof., Sociology
Suhey, Margaret A., Ph.D., Indiana U. Prof.
Emeritus, Linguistics
Suzuki, Misako, M.A., Ohio State U. Sr. Lec., Asian Studies
Swartz, Edward, Ph.D., U. of Maryland, College Park. Asst. Prof., Mathematics
Sweedberg, Richard, Ph.D., Boston Coll. Prof., Sociology
Sweat, Moss E., Ph.D., Massachusetts Inst. of Technology. Prof Emeritus, Mathematics
Talmi, Richard, Ph.D., California Inst. of Technology. Assoc. Prof., Philosophy
Taivola, Kristin, Ph.D., Eastern School of Music. Assoc. Prof., Music
Tagliacozzo, Eric, Ph.D., Yale U. Assoc. Prof., History
Taylor, Erin, Ph.D., U. of California, Los Angeles. Asst. Prof., Philosophy
Taylor, Keith W., Ph.D., U. of Michigan. Prof., Romance Studies
Teitelbaum, Tim, Ph.D., Carnegie-Mellon U. Assoc. Prof., Computer Science
Teng, Qiuyan, M.A., Cornell U. Sr. Lec., Asian Studies
Terrell, Maria Shea, Ph.D., U. of Virginia. Sr. Lec., Mathematics
Terrell, Robert, Ph.D., U. of Virginia. Sr. Lec., Mathematics
Terzian, Yervant, Ph.D., Indiana U. David C. Stork Professor in the Physical Sciences, Astronomy/NAIC
Thureck, Erik, Ph.D., U. of California, Berkeley. Edward Babcock Professor of Economics and Food Economics Emeritus, Nutritional Sciences/Economics
Thorne, Robert E., Ph.D., U. of Illinois. Prof., Physics/LASSP
Thornton, William P., Ph.D., U. of California, Berkeley. Prof., Mathematics
Tierney, Brian, Ph.D., Pembroke Coll. of Cambridge (England)
Bryce and Edith M. Bowman Professor in Humanistic Studies Emeritus, History
Tigner, Maury, Ph.D., Cornell U. Hans Bethe Prof. of Physics, Emeritus, Physics/LEPP†
Tidblad, Pamela, Ph.D., U. of California, Los Angeles Assoc. Prof., Sociology/Industrial and Labor Relations
Tomás Bevila, M.A., U. of Nevada, Reno. Sr. Lec., Romance Studies
Tranvét, Thuy, M.A., U. of Michigan. Sr. Lec., Romance Studies
Travers, T. Robert, Ph.D., and Gonyone and Caus Coll. Assoc. Prof., History
Tsimberov, Viktoria, M.S., Lsensovet Leningrad Inst. of Chemical Technology (Russia). Sr. Lec., Russian
Tynenrekov, Viktor, Ph.D., New York U. Asst. Prof., Economics
Tun, San San Hnin, Ph.D., U. of Nottingham (England). Sr. Lec., Romance Studies/Asian Studies
Turcotte, Donald L., Ph.D., California Inst. of Technology. Prof Emeritus, Earth and Atmospheric Sciences
Turner, James E., Ph.D., University College London. Prof., Philosophy
Turner, Terrence, Ph.D., Harvard U. Prof., Anthropology
Tye, Peter H., Ph.D., Massachusetts Inst. of Technology. Horace White Prof. of Physics, Physics/LNS
Ungirar, Cyrus, Ph.D., Northwestern U. Adj. Prof., Physics/LASSP†
Uphoff, Norman T., Ph.D., U. of California, Berkeley. Prof Emeritus, Government
Usher, David A., Ph.D., Cambridge U. (England). Assoc. Prof., Chemistry and Biological Chemistry
Vallin, Marie-Claire, Ph.D., U. of Nice (France). Assoc. Prof., Romance Studies
van de Walle, Nicolas, Ph.D., Princeton U. Assoc. Prof., Philosophy
Venezky, Joseph F., Ph.D., Harvard U. James A. Weeds Professor of Physical Sciences, Astronomy/CRSR†
Villarejo, Amy, Ph.D., U. of Pittsburgh. Assoc. Prof., Theatre, Film and Dance/Feminist, Philosophy, Gender, Sexuality Studies
Vladimirsky, Alexander, Ph.D., U. of California, Berkeley. Asst. Prof., Mathematics
Vogel, Kathleen, Ph.D., Princeton U. Asst. Prof., Science and Technology Studies
Vogtman, Karen L., Ph.D., U. of California, Berkeley. Prof., Mathematics
Volman, Thomas F., Ph.D., U. of Chicago. Assoc. Prof., Philosophy
Wagner, Michael, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Linguistics
Walhlín, Lars B., Ph.D., U. of Göteborg (Sweden). Prof., Mathematics
Walter, Geoffrey C. W., Ph.D., Princeton U. Assoc. Prof., German Studies
Waldrion, Colette Denise, M.A., U. of Paris. Prof., Anthropology
Walliser, Brian, Ph.D., University of California, Berkeley. Prof., History
Wang, Michelle D., Ph.D., U. of Michigan. Prof., Romance Studies
Wan, Henry Y., Jr., Ph.D., University of California, Davis. Prof., History
Wassemann, Ira M., Ph.D., Harvard U. Prof., Astronomy/Physics/CRSR†
Waugh, Linda R., Ph.D., Indiana U. Prof.
Emeritus, Romance Studies/Comparative Literature
Weatherson, Brian, Ph.D., Manash U.
Theatre and Film, Dance/Feminist, English
Way, Christopher, Ph.D., Stanford U. Assoc. Prof., Philosophy
Weathers, Brian, Ph.D., Princeton U. Prof., Psychology
Weiss, Brian, Ph.D., Macquarie U. (Australia). Assoc. Prof., Philosophy
Webster, James, Ph.D., Princeton U. Goldwin Smith Professor of Music
Weeden, Kim, Ph.D., Stanford U. Asst. Prof., Sociology
Weeks, Jessica, Ph.D., Stanford U. Asst. Prof., Government
Weil, Rachel, Ph.D., Princeton U. Assoc. Prof., History
Weiss, John H., Ph.D., Harvard U. Assoc. Prof., History
Weiss, Michael, Ph.D., Cornell U. Prof., Linguistics
Welker, Marina, Ph.D., U. of Michigan. Asst. Prof., Anthropology
West, James E., Ph.D., Louisiana State U. Prof., Mathematics
Wetherbee, Winthrop, Ph.D., U. of California, Berkeley. Avalon Professor of English and Medieval Studies Emeritus, English/Medieval Studies
Weir, Margaret, Ph.D., U. of Michigan. Assoc. Prof., Sociology/Human Development
White, William M., Ph.D., U. of Rhode Island. Prof., Earth and Atmospheric Sciences
Whitman, John B., Ph.D., Harvard U. Prof., Linguistics
Widom, Benjamin, Ph.D., Cornell U. Goldwin Smith Professor Emeritus of Chemistry and Chemical Biology
Wilcox, Charles F., Jr., Ph.D., U. of California, Los Angeles. Prof. Emeritus, Chemistry and Chemical Biology
Wilks, Daniel S., Ph.D., Oregon State U. Prof., Earth and Atmospheric Sciences
Williford, Andrew C., Ph.D., U. of California, San Diego. Assoc. Prof., Anthropology
Williams, L. Pearce, Ph.D., Cornell U. John Stambaugh Professor of the History of Science Emeritus, Science and Technology Studies
Wissink, Jennifer Parker, Ph.D., U. of Pennsylvania. Sr. Lec., Economics
Wittich, Peter, Ph.D., U. of Pennsylvania. Asst. Prof., Physics/LEPP
Wolczanski, Peter T., Ph.D., California Inst. of Technology. George W. and Grace L. Todd Professor of Chemistry and Chemical Biology
Wolff, John U., Ph.D., Yale U. Prof. Emeritus, Linguistics/Asian Studies
Wong, Shelley, Ph.D., U. of California, Berkeley. Assoc. Prof., English/Asian American Studies
Woubshet, Dagmawi, Ph.D., Harvard U. Asst. Prof., Near Eastern Studies
Wysocki, Mark W., M.S., Cornell U. Sr. Lec., Earth and Atmospheric Sciences
Yan, Haiping, Ph.D., Cornell U. Prof., Theatre, Film & Dance
Yan, Tung-Mow, Ph.D., Harvard U. Prof., Physics/LEPP
Yearsley, David G., Ph.D., Stanford U. Assoc. Prof., Music
Younes, Munther A., Ph.D., U. of Texas, Austin. Sr. Lec., Near Eastern Studies
Zabih, Raman, Ph.D., Stanford U. Prof., Computer Science
Zacher, Samantha, Ph.D., U. of Toronto (Canada). Asst. Prof., English
Zaslav, Neal A., Ph.D., Columbia U. Herbert Gussman Professor of Music
Zax, David B., Ph.D., U. of California, Berkeley. Assoc. Prof., Chemistry and Chemical Biology
Zayas, Vivian, Ph.D., U. of Washington. Asst. Prof., Psychology

*Laboratory of Atomic and Solid State Physics.
†Center for Radiophysics and Space Research
‡National Astronomy and Ionosphere Center
¶Laboratory of Elementary Particle Physics
#Institute for the Study of the Continents
INDEX

A
Absence, leave of, 5. See also individual schools and colleges
Absences from class, 14
Academic calendar, inside back cover
   arts and sciences calendar supplement, 448
Academic honors. See Honors under individual schools and colleges, departments, and special programs
Academic integrity, 7
Acting, 674
Add/drop/change period and fee, 12
Adding courses. See individual schools and colleges
Administration. See individual schools and colleges
   university, inside front cover
Adult education, 46, 204
Advanced placement, 8–12. See also individual schools and colleges
Advising. See individual schools and colleges
Aerospace engineering, 226, 276
Aerospace studies (ROTC), 407
Africana Studies and Research Center, 448
Agricultural Experiment Station, 29
Agricultural sciences, 41
Agriculture
   education, 46, 94
   international, 49, 109
Agriculture and Life Sciences, College of, 28
Academic Achievement and Petitions, Committee on, 40
   academic deficiency, 40
   academic honors, 40
   academic integrity policy, 39
   academic policies and procedures, 39
   admission, 29
   advising, 28
Albany Programs, 35
   Career Development, Office of, 29
   Cornell in Washington, 35
   Counseling and Advising office, 28
   course changes (add/drop/change), 39
   course enrollment, 39
   courses, descriptions of, 54
   degree programs, 30
   exemption from requirements, 40
   facilities, 29
   faculty, 122
   graduation requirements, 36
   interdepartmental/intercollege courses, 55
   internships, 35
   major fields of study, 41
Multicultural and Diversity Programs, 28
   nondepartmental courses, 57
   off-campus opportunities, 35
   overseas academic programs, 36
   petitions procedures, 40
   registration, 39
   requirements for graduation, 36
   research honors program, 31
   SEA Semester, 35
   Shoals Marine Laboratory, 35
   special programs, 54
   special students, 29
   student services, 28
   transfer, 29
   withdrawal, 41
Air Force ROTC, 407
Akkadian, 621
Albany Programs, 35, 317
American Indian studies, 55
American studies, 452
Andrew D. White Professors-at-Large, 17
Animal physiology, 159, 165
Animal sciences, 32, 41, 66
Animals, use of for courses, 7
Anthropology, 458
Apparel design, 313
Apparel/textile management, 313
Applied and engineering physics, 244
Applied economics and management, 42, 58
Applied mathematics, 229
Applied Mathematics, Center for, 17, 494
Arabic, 619
Aramaic, 620
Archaeology, 465
Architecture, 128
   alternative programs, 130
   curriculum, 129
   dual-degree options, 130
   professional degree programs, 128
   Rome program, 128
   summer term in, 130
   transfer students, 130
Architecture, Art, and Planning, College of, 126
   academic policies, 127
   advisors, 126
   architecture, 128
   art, 138
   city and regional planning, 145
   degree programs, 126
   facilities, 126
   faculty, 156
   landscape architecture, 155
   libraries, 126
   museums and galleries, 126
   Rome Program, 126, 128, 139
   scholastic standards, 127
   student work, 127
Army ROTC program, 404
Art, 138
INDEX 697

concentration, 139
courses, 141
curriculum, 139
master of fine arts program, 140
Rome Program, 139
undergraduate program, 138
Art history, 575
Arts and Sciences, College of, 436
academic actions, 446
academic integrity, 444
academic options, 442
academic standing, 446
acceleration, 440
adding and dropping courses, 445
administration, 436
advanced placement, 437, 439
advising, 444
breadth requirements, 439
calendar, 448
college requirements, 436, 437, 439
College Scholar Program, 442, 514
Cornell in Washington, 444
course(s),
noncredit, 441
repeating of, 441
dean's list, 446
distinction (honors), 447
distribution requirements, 437
double majors, 440
double registration, 442
dual-degree programs, 442
electives, 440
enrollment, 445
faculty, 686
faculty advisors, 444
FALCON, 443, 468, 475, 477
fieldwork, 444. See also individual departments and special programs
foreign language requirement, 436
forgery on forms, 444
grades, 446
graduation requirements, 436
honors, 447. See also individual departments and special programs
incomplete, grade of, 446
Independent Major Program, 442, 582
independent study, 442
internal transfer, 447
language
course placement and credit, 436, 437
requirement, 436, 437
study, 443
Language House Program, 443
leaves of absence, 446
limits on courses and credits, 445
off-campus programs, 443
prelaw study, 26, 443
premedical study, 26, 443
registration, 445
requirements, 436
residence, 440
R grades, 446
special programs, 442
student advisors, 444
study abroad, 443, 447
S–U grades, 446
summer session credit, 441
Teacher Education Program, 442
transferring credit, 447
transfer within Cornell, 447
Undergraduate Research Program, 443
withdrawal, 447
Asian American Studies Program, 481
Asian studies, 468
general education courses, 469
languages. See specific language
literature and linguistics, 469
minors, 468
study abroad, 469
Astronomy, 482
Athletics and physical education, 410
courses, 410
requirement, 16
swim test, 16
Atmospheric sciences, earth and, 88, 263, 522
Attendance, class, 14. See also individual schools and colleges
Auditing courses, 12. See also individual schools and colleges

B
Bengali, 473
Billing and payment information, 6
Biochemistry, molecular and cell biology, 166
Biochemistry, program in, 159
Biological engineering, 218, 230
Biological and environmental engineering, 42, 69, 218, 230, 246
Biological sciences, 42, 159, 487
advising, 163
curriculum committee, 163
distribution requirement, 158
faculty, 189
general courses, 163
honors program, 32, 162
independent research, 162
major, 158
requirements, 159
sections
animal physiology, 165
biochemistry, molecular and cell biology, 166
ecology and evolutionary biology, 168
general courses, 163
genetics and development, 172
microbiology, 175
neurobiology and behavior, 177
plant biology, 180
Shoals Marine Laboratory, 185
use of animals, 158
Biology and society major, 43, 315, 487
Biomedical engineering, 230, 236, 248
Biometry and statistics, 43, 74
Botany. See Plant biology
Burmese, 474
Bursar information, 5
Business and preprofessional study, 25

C
Calendar
   arts and sciences, 448
   Cornell academic, inside back cover
Cambodian (Khmer), 478
Campus Code of Conduct, 5
Capital Semester, 317
Catalan, 643
Cell biology, biochemistry, molecular,
   and, 166
Center for Applied Mathematics,
   17, 494
Center for International Studies, the
   Mario Einaudi, 18
Certification, teacher, 47, 314
Chemical and biomolecular engineering,
   250
Chemical engineering, 219, 237
Chemistry and Chemical Biology,
   department of, 494
   courses, 495
   laboratory course regulations, 495
   program for science teachers, 495
China and Asia-Pacific Studies, 500
Chinese, 474
City and regional planning, 145
   courses, 147
   degree options, 147
   degree requirements, 145
   graduate program, 147
   off-campus opportunities, 146
   Program in Urban and Regional
   Studies, 147
Civil engineering, 220
Civil and environmental engineering,
   237, 252
Civil infrastructure, 231
Class meeting times, 14
Classics, department of, 501
Code of Academic Integrity, 7
Cognitive science program, 19
Collective bargaining, 349, 352

College Entrance Examination Board
   (CEEB), 8
College Scholar Program, 442, 514
Combined degree programs, 26
Communication, 44, 77
Comparative Economic Development,
   Program on, 18
Comparative literature, 514
Computational biology, 159, 192
Computational science and engineering,
   192
Computer science, 192, 195, 220, 231,
   261, 518
Computing and Information Science
   (CIS), 192
   engineering statistics, 232
   courses, 194
Computing in the Arts, 521
Concentrations. See individual schools
   and colleges, departments, and
   programs
Continuing education, 204
Continuing Education Information
   Service, 204
Cornell Abroad, 19. See also individual
   schools and colleges
Cornell’s Adult University (CAU), 204
Cornell Advanced Standing Examination
   (CASE), 8–12, 457
Cornell Institute for Public Affairs, 22
Cornell in Washington, 22, 204. See also
   individual schools and colleges
Cornell Medical College, 5
Cornell Plantations, 23
Course(s). See also Registration,
   individual schools and colleges
   add/drop/change period, 12
   auditing, 12
   enrollment, 12
   extramural, 204
   final examinations, 14
   information, 12
   numbering system, 12
   source codes, 12
Credit
   advanced placement, 8–12. See also
   individual schools and colleges

transfer of. See individual schools and
   colleges
Crop and soil sciences, 45, 81
Curriculum. See individual schools and
   colleges
CyberTower, 204
Czech language, 656

D
Dance, 680
Degree programs. See individual schools
   and colleges
Design
   apparel, 313
   architectural, 131
   interior, 312
   theater, 675
Design and environmental analysis, 312,
   330
Development sociology, 45, 85
Directing, theater, 674
Distance learning, 204
Distribution requirement. See individual
   schools and colleges
Drama. See Theatre
Drawing, 142
Dropping courses, 12. See also individual
   schools and colleges
Dual degree programs. See individual
   schools and colleges
Dutch, 553

E
East Asia Program, 528
East Asia Studies Minor, 468
Earth and atmospheric sciences, 42, 88,
   263, 522
Ecology and evolutionary biology, 160,
   168
Economics, department of (Arts and
   Sciences), 528
Education, 46, 94
Einaudi, Mario, Center for International
   Studies, 18
Electrical engineering, 221
Electrical and computer engineering, 221,
   231, 266
Empire State students, 312
Engineering, College of, 210
academic standing, 216
advanced placement, 215
advising, 213
affiliation with a major, 213
career services, 214
common courses, 240
Communications Program, 214, 240
Cooperative Education, 214
cooperative program with the
Johnson Graduate School of
Management, 215, 236
degree programs, 211, 235
distribution courses, 212, 241
diversity programs, 214
double major, 214
dual-degree program, 214
facilities, 210
faculty, 289
honors program, 218
independent major, 214, 223
international programs, 215
introduction to engineering courses,
243
leave of absence, 217
Lester Knight Scholarship Program,
215, 236
liberal studies distribution, 212
majors, 218
master of engineering degrees, 235
minors, 214, 228
requirements for graduation, 211
residence requirements, 217
special programs, 214
S–U grades, 217
technical writing, 211
transfer credit, 217
withdrawal, 218
Engineering management, 232, 237
Engineering mechanics, 238
Engineering physics, 222, 238, 244

English
second language, 544
department of, 534
First-Year Writing Seminars, 534
for academic purposes, 544
Enrollment. See also Registration,
individual schools and colleges
course, 12
Entomology, 32, 47, 98
Environmental engineering, 223, 232, 252
Environmental toxicology, 56
Ethics and Public Life, 24
Examinations
advanced placement, 8–12
College Entrance Examination Board
(CEEB), 8
Cornell Advanced Standing
Examination (CASE), 9–12, 437
departmental advanced standing, 8
evening, 15
final, 14
Exchange programs. See individual
schools and colleges
Extension courses (ILR), 368
Extension education, 46
Extramural study, 204

F
Facilities. See individual schools and
colleges
Facility planning and management, 312
Faculty roster. See individual schools and
colleges
FALCON (intensive language program),
443, 468, 475, 477
Fees and expenses
to add/drop/change courses, 12
billing and payment, 6
late course enrollment, 12
refund policies, 6
tuition, 5
Feminist, Gender & Sexuality Studies, 545
Fiber science, 513
Fiber science and apparel design, 513,
334

Fieldwork. See individual schools and
colleges, departments, and special
programs
Film studies, 677
Final examinations, 14
Finance and real estate, 306
First-Year Writing Seminars, 581. See also
individual schools and colleges
Food and Nutrition Policy, Cornell
Program in, 18
Food science, 47, 100
Foreign language requirement. See
individual schools and colleges,
departments, and special programs
Foreign languages. See specific language
Frank H. T. Rhodes professorship, 17
French
language, 643
literature, 643
Freshman writing seminars. See
individual schools and colleges. See
also First-Year Writing Seminars

G
Gender and Global Change, 18
Genetics and development, 161
Geological sciences, 239, 522
German studies, department of, 548
Gerontology concentration, 316
Government, department of, 553
Grade(s), 15–16. See also individual
schools and colleges
Graduate School, 294
Graduation, requirements for, 16. See also
individual schools and colleges
Greek, 504

H
Health insurance services, 6
Hebrew, 620
Hindi, 476
Hindi-Urdu, 621
Hispanic American Studies Program. See
Latino Studies Program
History, department of, 563
History of Art, department of, 575
Ho-Nun-De-Kah, 40
Honors. See individual schools and colleges, departments, and special programs
Horticulture, 104
Hospitality facilities and operations, 300
Hotel Administration, School of, 295
curriculum, 295, 297
facilities, 295
faculty, 309
foreign languages, 296
grading system, 296
independent study, 296
management-intern program, 296
practice credit requirement, 296
requirements for graduation, 295
study abroad, 296
Human Biology, Health, and Society Program, 311, 397
Human Biology Program, 580
Human development, 313, 337
Human Ecology, College of, 311
advising, 311, 312
career planning, 311, 313, 317, 318
course enrollment, 322, 323
course loads, 322
degree programs, 311
double-registration programs, 317
elective credits, 320
Empire State students, 312
facilities, 311
faculty, 347
field study, 316
foreign language study and placement, 321
grades, 325
graduation requirements, 319
honors, 315, 316, 327
in absentia study, 324
interdepartmental major, 315
international study, 315
leave of absence, 324
majors, 312
mature students, 311
multicultural programs, 318
off-campus programs, 316, 317
petition process, 323
registration, 322
study abroad, 315
transfer students, 312
Undergraduate Affairs, 311
Urban Semester Program, 316, 329
withdrawal, 325
Human factors and ergonomics, 312
Human participants in research, 7
Human resource studies, 349, 356
Humanities, Society for the, 663
Hungarian, 656

I
In absentia fees, 5
In absentia study. See individual schools and colleges
Incomplete, grade of, 16. See also individual schools and colleges
Independent Major Program (arts and sciences), 442, 582
Independent study. See individual schools and colleges, departments, and special programs
Indonesian, 476
Industrial and Labor Relations, School of, 349
academic standing, 351
advising, 350
dean’s list, 351
degree programs, 349
elective courses, 350
extension courses, 368
faculty, 369
grades, 351
graduation requirements, 350
honors program, 352
in absentia study, 350
interdepartmental courses, 362
internships, 351, 352
leave of absence, 350
multicultural programs, 350
required courses, 350
scheduling and attendance, 350
special academic programs, 351
student services, 349
study abroad, 352
study options, 350
withdrawal, 350
Industrial systems and information technology, 233
Inequality, Center for Study of, 19, 582
Inequality Minor, 582
Information engineering, 282
Information science, 48, 108, 200, 224, 584
Information science, systems, and technology, 224, 271
Institute for African Development, 18
Insurance, 6
Interior design, 312
Interdisciplinary centers, programs, and studies, 17
Internal Transfer Division, 16
International agriculture and rural development, 49, 109
International and comparative labor, 349, 360
International Political Economy, 19
International relations minor, 587
International Studies, Mario Einaudi Center for, 18
International Studies in Planning, 19
Internships. See individual schools and colleges
Introduction to engineering courses, 243
Italian
literature and culture, 646
studies, 647

J
Japanese, 477
Jewish studies program, 589
John S. Knight Institute for Writing in the Disciplines, 590
Johnson Graduate School of Management, 370
K
Khmer (Cambodian), 478
Knight (John S.) Institute for Writing in the Disciplines, 590
Korean, 478

L
Labor
  economics, 349, 362
  history, 349, 352
  law, 349, 352
  relations, 349
Laboratory course regulations, 495
Landscape architecture, 49, 110, 155
Language
  course placement and credit (arts and sciences), 436–437
  placement, 8, 436, 437
  requirement, 436, 437. See individual schools and colleges, departments, and programs
Language House Program, 443
Latin, 505
Latin American Studies Program, 592
Latino Studies Program, 593
Law and Society, 594
Law School, 382
Leave of absence, 5. See also individual schools and colleges
Lesbian, Bisexual, and Gay Studies, 596
Linguistics, 597

M
Management, Johnson Graduate School of, 370
Marine corps options (Navy ROTC), 406
Marine science, 184
Mario Einaudi Center, 18
Marketing, tourism, strategy, and information systems, 304
Materials science and engineering, 225, 234, 239, 272
Mathematics
  applied, 229
  Center for Applied, 17, 494
  department of, 601
  Mechanical and aerospace engineering, 276
  Mechanical engineering, 225, 235, 239
  Mechanics, theoretical and applied, 288
  Medical College, 5
  Medical insurance, 6
  Medicine, veterinary, 417
  Medieval studies, 610
  Microbiology, 161, 175
  Military science, 404
  Molecular and cell biology, 166
  Museum of Art, Herbert F. Johnson, 126
  Museums and galleries, 126
  Music, department of, 612

N
Natural resources, 51, 113
Naval science, 405, 406
Navy ROTC program, 405
Near Eastern Studies, department of, 618
Nepali, 479
Neurobiology and behavior, 161, 177
Nuclear science and engineering, 281
Nutritional sciences, 51, 314, 397
Nutritional Sciences, Division of, 397
career options, 397
  courses, 398
  facilities, 397
  faculty, 403
  graduate programs, 398
  honors program, 398
  undergraduate programs, 397

O
Officer education (ROTC), 404
Operations research and engineering, 226
Operations research and information engineering, 239, 282
Operations research and management science, 235
Organizational behavior, 349, 364
Organizational management, communication, and law, 297
Outdoor education program, 413

P
Painting, 143
Pali, 479
Payment of bills, 6
Peace Studies Program, 19
Persian, 621
Philosophy, department of, 624
Photography, 143
Physical education, 410
Physics
  engineering, 222, 238, 244
department of, 627
Placement examinations, 8–12
Planning, city and regional, 145
Plant biology, 53, 161, 180
Plant breeding and genetics, 53, 117
Plant pathology and plant-microbe biology, 53, 119
Plant sciences, 34, 52
Plantations, Cornell, 23
Playwriting, 674
Policy analysis and management, 314, 345
Polish, 656
Political science. See Government
Population and Development Program, 19
Portuguese, 649
Prelaw study, 26, 443
Preliminary examinations, 15
Premedical study, 26, 443
Preveterinary study, 26
Printmaking, 143
Privacy of records, 6
Psychology, department of, 633
Public Affairs, Cornell Institute for, 22

Q
Quechua, 649
R
Real Estate, program in, 24
Records, 6
Refund policies, 6
Registration, 5. See also individual schools and colleges
  add/drop/change period, 12
  auditing, 12
  course enrollment, 12
  fees, 5
  leaves and withdrawals, 5
Religious studies, 641
Requirements for graduation, 16
Reserve Officer Training Corps (ROTC), 404
Residence requirements. See individual schools and colleges
Rhodes, Frank H. T., professorship, 17
Romance languages. See individual languages
Romance studies, department of, 643
Rome Program, 126, 139
ROTC (officer education), 404
Russian
  language, 654
  literature, 655
  major, 653

S
Sanskrit, 479
Science and technology studies, 657
Science of Earth Systems (SES), 24, 53, 227, 522
Science of Natural and Environmental Systems, 54
Sculpture, 144
SEA Semester, 35, 188
SES (Science of Earth Systems), 24, 53, 227, 522
Serbo-Croatian, 657
Shoals Marine Laboratory, 35, 185
Sinhala (Sinhalese), 479
Social statistics, 349, 367
Society for the Humanities, 663
Sociology, department of, 664
Soil science, 45, 81
South Asia Program, 670
South Asia Studies Minor, 468
Southeast Asia Program, 670
Southeast Asia Studies Minor, 468
Spanish
  language, 650
  literature, 650
  major, 649
Stage management, 675
Statistical Science, department of, 193
Student records policy, 6
Study abroad, 19. See also individual schools and colleges
Subject codes, course, 12–14
S–U grades, 15
Summer session, 205
  courses, 206
Swedish, 553
Systems engineering, 240, 287

T
Tagalog, 480
Teacher certification, 46, 314
Teacher education, 442
  in mathematics, 603
Test(s)
  advanced placement, 8–12
  language placement, 12, 436–437
Thai, 480
Theatre, film, and dance, 670
Theoretical and applied mechanics, 288
Toxicology, environmental, 56
Transcripts, 16
Transfer, internal, 16
Tuition billing and payment information, 6
Turkish, 621

U
Ukrainian, 657
Undergraduate admissions, 5
Undergraduate Research Program, 443

Urban and regional studies, 145
Urban Semester Program, 316, 329
Urdu, 480

V
Veterinary Medicine, College of, 417
Vietnamese, 480
Visual studies, 685

W
White (Andrew D.) Professors-at-Large, 17
Winter session, 205
Withdrawal, 5. See also individual schools and colleges
Women’s studies (now Feminist, Gender & Sexuality Studies), 545
Writing
  Engineering Communications Program, 214, 240
  First-Year Writing Seminars, 590
  Institute, John S. Knight, 590
teaching, 591
workshop, 591
Cornell University Calendar

**Fall Semester**

- Online registration verification
- Residence halls open
- New undergraduate student registration
- New student orientation begins
- New graduate student registration
- Course add/drop begins
- Instruction begins
- Fall break: instruction suspended
- Instruction resumes
- Homecoming
- First-Year Parents Weekend
- Thanksgiving recess: instruction suspended, 1:10 P.M.
- Final examination period*
  - Residence halls close

**Winter Session Period Begins**

- Three-week classes begin
- Winter session period ends

**Spring Semester**

- Online registration verification
- Residence halls open
- Course add/drop begins
- 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

---

*Exams begin Wednesday at 7:00 p.m.*

The dates shown in this calendar are subject to change at any time by official action of Cornell University.

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.

The courses and curricula described in this catalog, and the teaching personnel listed herein, are subject to change at any time by official action of Cornell University.

The rules and regulations stated in this catalog are for information only and in no way constitute a contract between the student and Cornell University. The university reserves the right to change any regulation or requirement at any time.

This catalog was produced by the Office of Publications and Marketing at Cornell University.