Cornell University Calendar

**Fall Semester**
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
Pre-course enrollment for spring
Homecoming
First-Year Family Weekend
Thanksgiving recess:
instruction suspended, 1:10 p.m.
Instruction resumes
Instruction ends
Study period
Final examinations begin
Final examinations end
Residence halls close

**Winter Session Period Begins**
Three-week classes begin
Winter session period ends

**Spring Semester**
Residence halls open
Course add/drop begins
Instruction begins
Spring break: instruction suspended
Instruction resumes
Pre-course enrollment for fall
Instruction ends
Study period
Final examinations begin
Final examinations end
Residence halls close (students who are graduating
may stay through Commencement Day)
Senior Week
Commencement

**Summer Session**
Three-week session classes begin
Eight-week session classes begin
Six-week session classes begin

2004–05
- Friday, August 20
- Friday, August 20
- Friday, August 20
- Monday, August 23
- Wednesday, August 25
- Thursday, August 26
- Saturday, October 9
- Wednesday, October 13
- TBA
- Saturday, October 16
- Friday–Sunday, October 22–24
- Wednesday, November 24
- Monday, November 29
- Saturday, December 4
- Sunday–Wednesday, December 5–8
- Thursday, December 9
- Friday, December 17
- Saturday, December 18
- Monday, December 27
- Monday, January 3
- Friday, January 21

2005–06
- Friday, August 19
- Friday, August 19
- Friday, August 19
- Monday, August 22
- Wednesday, August 24
- Thursday, August 25
- Saturday, October 8
- Wednesday, October 12
- TBA
- Saturday, October 15
- Friday–Sunday, October 28–30
- Wednesday, November 23
- Monday, November 28
- Saturday, December 3
- Sunday–Wednesday, December 4–7
- Thursday, December 8
- Friday, December 16
- Saturday, December 17
- Tuesday, December 27
- Tuesday, January 3
- Saturday, January 21

- Monday, January 17
- Thursday, January 20
- Monday, January 24
- Saturday, March 19
- Monday, March 28
- TBA
- Saturday, May 7
- Sunday–Wednesday, May 8–11
- Thursday, May 12
- Friday, May 20
- Saturday, May 21
- Sunday–Saturday, May 22–28
- Sunday, May 29

- Wednesday, June 1
- Monday, June 13
- Monday, June 27

- Wednesday, May 31
- Monday, June 12
- Monday, June 26

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 Communication and Marketing Services at Cornell University.
Courses of Study

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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
@ geographic breadth
# historical breadth
Courses with names and descriptions enclosed in brackets—[ ]—are not offered fall 2004 and spring 2005.
Introduction

Courses of Study (cuinfo.cornell.edu/Academic/Courses/), 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. Additionally, a student handbook, distributed to all incoming students, describes life at Cornell. The Policy Notebook (www.univco.cornell.edu/policy/policies.html) is also distributed to each new student, summarizing pertinent university policies, including the campus Code of Conduct and the Code of Academic Integrity. Students should consult with their college’s advising office for specific information on their college’s academic policies and procedures, degree programs, and requirements.

All these publications are also available for viewing on CUINFO, the university’s electronic information system, and in print at the various university libraries, the Office of the Dean of the University Faculty, the Office of University Counsel, the Office of the Judicial Administrator, and the college offices.

Not included in this publication is information concerning the Medical College and the Graduate School of Medical Sciences, located in New York City.

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

Undergraduate Admissions Office, 410 Thurston Avenue, Ithaca, NY 14850-2488, 607-255-5241.

Graduate School, 143 Caldwell Hall, Ithaca, NY 14853-2602, 607-255-4884.


College of Veterinary Medicine, Admissions Office, Cornell University, Schumman Hall, Ithaca, NY 14853-8401, 607-255-3700.

Medical College and Graduate School of Medical Sciences, Office of Admissions, 445 E. 69th Street, New York, NY 10021, 212-746-1067/212-746-6565.

CUINFO ON THE WEB

It is not possible to keep this single-volume course list completely up-to-date. The most current information regarding course schedules, sections, rooms, credits, and registration procedures may be found on CUINFO, Cornell’s electronic information source. The Course and Time Roster and the Course and Room Roster, published each semester by the Office of the University Registrar, may also be accessed through the web. The URL is: cuinfo.cornell.edu. Students are also advised to consult individual college and department offices for up-to-date course information.

EXPLANATION OF COURSE NUMBERING SYSTEMS AND COURSE PREFIXES

The course levels have been assigned as follows:

- 100-level course—introductory course, open to all qualified students
- 200-level course—lower-division course, open to freshmen and sophomores, may have prerequisites
- 300-level course—upper-division course, open to juniors and seniors, prerequisites
- 400-level course—upper-division course, open to seniors and graduate students, 200- and 300-level course prerequisites or equivalent
- 500-level course—professional level (e.g., management, law, veterinary medicine)
- 600-level course—graduate-level course, open to upper-division students
- 700-level course—graduate-level course
- 800-level course—master’s level, thesis, research
- 900-level course—doctoral level, thesis, research

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

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

- Agriculture and Life Sciences
- Architecture, Art, and Planning
- Arts and Sciences
- Biology
- Chemical and Atmospheric Sciences
- Civil and Environmental Engineering
- Earth and Environmental Sciences
- Economics
- Engineering
- Human Ecology
- Industrial and Labor Relations
- Information Science
- Law
- Medicine
- Veterinary Medicine

Group 2: Graduate professional divisions

- Management
- Information Science
- Law
- Management
- Veterinary Medicine

There are no courses 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 0-999 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.

Course Prefixes and Their Meanings

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<th>Prefix</th>
<th>Meaning</th>
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<td>Asian American Studies</td>
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<td>Applied Engineering Physics</td>
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<td>Aerospace Studies</td>
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<td>Africana Studies and Research Center</td>
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<td>BEE</td>
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<td>Animal Physiology</td>
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<td>BIOBM</td>
<td>Biochemistry, Molecular and Cell Biology</td>
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<td>Microbiology</td>
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<td>BIONB</td>
<td>Neurobiology and Behavior</td>
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<td>Shoals Marine Laboratory</td>
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<td>B &amp; SOC</td>
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### General Information - 2004-2005

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<td>Natural Resources</td>
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<td>Literature in Vietnamese</td>
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<td>Veterinary Medicine</td>
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<tr>
<td>VTFMD</td>
<td>Population Medicine and Diagnostic Sciences</td>
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### ACCREDITATION

Cornell University is accredited by the Middle States Association of Colleges and Schools. A copy of the most recent reaffirmation of Cornell's accreditation can be found at dpb.cornell.edu/trp/accreditation.htm. Requests to review additional documentation supporting Cornell's accreditation should be addressed to Michael Matier, Director, Institutional Research and Planning, Cornell University, 440 Day Hall, Ithaca, NY 14853-2801, mmwm5@cornell.edu.

### 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:

- a. 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 7-9.
- b. Acceptable performance on a Cornell department exam (offered only in some subjects, usually during orientation).
- c. 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.
- d. International credentials from "A" level or IB Examinations are listed on page 9.

**Please note:** Cornell University does not accept credit for courses sponsored by colleges but taught in high schools to high school students, even if the college provides a transcript of such work. Students who have taken such courses may, however, earn credit by taking an appropriate examination as described in paragraph a or b above. The appropriate department of instruction within the university sets the standards of achievement that must be met for advanced placement in its subject, recommends Advanced Placement credit for those who meet the standards, and determines which Cornell courses the credit places students out of. The final decision for awarding advanced placement credit at Cornell and applying it to degree requirements rests with each individual college (consult the relevant college sections of Courses of Study). Students need not accept advanced placement, although forfeiting the advantage of moving quickly into advanced courses affects one's overall education. If they take the Cornell...
course they have placed out of, they relinquish the advanced placement credit.

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

**Departmental advanced standing examinations.** In certain subjects, students may also qualify for advanced placement or credit, or both, on the basis of departmental examinations given on campus during Orientation Week. A schedule of these examinations appears in the orientation booklet mailed in late summer to entering students. The departments that award advanced placement and credit on the basis of departmental examinations are shown on pages 7–10. Students need to register for those examinations in the relevant department.

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

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

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### CEEB's AP Exams

<table>
<thead>
<tr>
<th>Subject</th>
<th>Score</th>
<th>Advanced Placement (AP) Credit</th>
<th>Placement</th>
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<tr>
<td>Arabic</td>
<td>Department of Near Eastern Studies determines credit and placement based on departmental examination.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biology</td>
<td>see <a href="http://www.bio.cornell.edu/advising/ap.cfm">www.bio.cornell.edu/advising/ap.cfm</a> for credit and placement information.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry</td>
<td>5</td>
<td>4 credits</td>
<td>Department determines placement on basis of student/adviser meeting prior to registration and/or an exam given during fall orientation. No advanced placement credit for students who take 206, 207, or 211; students who take 215 will also receive 4 AP credits.</td>
</tr>
<tr>
<td>Computer science AB</td>
<td>4,5</td>
<td>4 credits</td>
<td>Placement out of COM S 100. Department also offers placement exam during fall orientation.</td>
</tr>
<tr>
<td>Computer science A</td>
<td>5</td>
<td>4 credits</td>
<td>Placement out of COM S 100. Department also offers placement exam during fall orientation.</td>
</tr>
<tr>
<td>Economics, micro</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of ECON 101.</td>
</tr>
<tr>
<td>Economics, macro</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of ECON 102.</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 101 or 111 and NTRES 201.</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 the CASEf because they will 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 the CASEf because they will obtain appropriate placement.</td>
</tr>
<tr>
<td>German</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of German Studies determines placement. Students should take the CASEf because they will 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 111.</td>
</tr>
<tr>
<td>Government and politics, comparative</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of GOVT 131.</td>
</tr>
<tr>
<td>Greek, Ancient</td>
<td></td>
<td></td>
<td>Department of Classics determines credit and placement based on departmental examination.</td>
</tr>
<tr>
<td>Greek, Modern</td>
<td></td>
<td></td>
<td>Department of Near Eastern Studies determines credit and placement based on 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>Hebrew</td>
<td></td>
<td></td>
<td>Department of Near Eastern Studies determines credit and placement based on departmental examination.</td>
</tr>
<tr>
<td>American history</td>
<td>4.5</td>
<td>4 credits</td>
<td>Placement out of HIST 153 and 154.</td>
</tr>
<tr>
<td>European history</td>
<td>4.5</td>
<td>4 credits</td>
<td>Placement out of HIST 152.</td>
</tr>
<tr>
<td>Human Geography</td>
<td></td>
<td></td>
<td>Department of Romance Studies determines 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 the CASE because they will 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 the CASE because they will obtain appropriate placement.</td>
</tr>
<tr>
<td>Latin</td>
<td></td>
<td></td>
<td>Department of Classics determines credit and placement based on departmental examination.</td>
</tr>
<tr>
<td>Mathematics BC</td>
<td>4.5</td>
<td>8 credits</td>
<td>Placement out of MATH 106, 111–112 and 121–122. Engineering and BEE students receive only 4 credits.</td>
</tr>
<tr>
<td>Mathematics AB or AB</td>
<td></td>
<td></td>
<td>Placement out of MATH 106, 111, and 121. Permission to take MATH 112, 122, or 191 (Engineering and BEE students receive no credit).</td>
</tr>
<tr>
<td>subscore of BC exam</td>
<td>3,4,5</td>
<td>4 credits</td>
<td>Placement out of MATH 106, 111, and 121. Permission to take MATH 112, 122, or 191 (Engineering and BEE students receive no credit).</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td></td>
<td>Department 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 101–102. Students who also have a score of 4 or 5 on Mathematics BC may choose to accept 4 AP credits for 207 or 112 and then take 208 or 213.</td>
</tr>
<tr>
<td>Physics C–Mechanics</td>
<td>4.5</td>
<td>4 credits</td>
<td>Placement out of PHYS 101.</td>
</tr>
<tr>
<td>Physics C–Electricity/</td>
<td>5</td>
<td>4 credits</td>
<td>Placement out of PHYS 112 or 207, or placement into PHYS 116 with no AP credit. For more information, contact department representative.</td>
</tr>
<tr>
<td>Magnetism</td>
<td></td>
<td></td>
<td>Placement out of PHYS 213.</td>
</tr>
<tr>
<td>Psychology</td>
<td>4.5</td>
<td>3 credits</td>
<td>Placement out of PSYCH 101.</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 because they will 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 because they will obtain appropriate placement.</td>
</tr>
<tr>
<td>Statistics (excluding</td>
<td>4.5</td>
<td>3 credits</td>
<td>Placement out of AEM 210, IRLST 210, PAM 210, or MATH 171.</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>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.
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 below. 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 eight-credit sequences that satisfy prerequisites for further work in the department: Chemistry 207–208 and Chemistry 215–216. Chemistry 215–216 is the sequence 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 four credits. A student may earn four or eight credits by suitable performance on the departmental examination. To take the departmental examination students must sign up beforehand in the Chemistry and Chemical Biology Instructional Office, 131 Baker Laboratory.

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 adviser, and the professors teaching the courses. Questions may also be directed to the director of undergraduate studies, in 760A S. T. Olin Laboratory. Students receiving advanced placement who are interested in a major in chemistry or a related science should consider taking CHEM 215–216 and should consult the CHEM 215 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 four advanced placement credits and may take COM S 211. These credits may be used to satisfy the requirement in computer programming for students in the College of Engineering.

Freshmen may also earn four credits by satisfactory performance on a departmental examination to be given during Orientation Week. To take the departmental examination, students must sign up beforehand in the Undergraduate Office, 303 Upson Hall.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Baccalaureat (IB) Higher Level Examination</td>
<td></td>
<td>subject to departmental review</td>
</tr>
<tr>
<td>Anthropology</td>
<td>7</td>
<td>8 credits (introductory biology)</td>
</tr>
<tr>
<td>Chemistry</td>
<td>6</td>
<td>6 credits (BIO G 109–110)</td>
</tr>
<tr>
<td>Chemical &amp; Physical Systems</td>
<td>6 or 7</td>
<td>8 credits (PHYS 101 and 102)</td>
</tr>
<tr>
<td>Chemistry</td>
<td>6 or 7</td>
<td>4 credits (CHEM 207)</td>
</tr>
<tr>
<td>Computer Science</td>
<td>6 or 7</td>
<td>4 credits (COM S 100)</td>
</tr>
<tr>
<td>Economics</td>
<td>6 or 7</td>
<td>6 credits (ECON 101 and 102)</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>3 credits (excluding Arts and Sciences students)</td>
</tr>
<tr>
<td>Music</td>
<td>7</td>
<td>4 credits and placement out of MATH 106 and 111. Students may obtain more credit by taking the Mathematics Department placement exam.</td>
</tr>
<tr>
<td>Philosophy</td>
<td></td>
<td>by departmental examination</td>
</tr>
<tr>
<td>Physical Science</td>
<td>6 or 7</td>
<td>3 credits</td>
</tr>
<tr>
<td>Physics</td>
<td>6 or 7</td>
<td>8 credits (4 credits, CHEM 206; 4 credits, PHYS 101)</td>
</tr>
</tbody>
</table>

General Certificate of Education (GCE) Advanced ("A") Level Examination passes are awarded advanced standing and credit on receipt of the original or a certified copy of the examination results.

<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 credits (introductory biology)</td>
</tr>
<tr>
<td>Chemistry</td>
<td>A</td>
<td>8 credits (CHEM 207 and 208)</td>
</tr>
<tr>
<td>Economics</td>
<td>B</td>
<td>4 credits (CHEM 207)</td>
</tr>
<tr>
<td>English literature</td>
<td>A</td>
<td>6 credits (ECON 101 and 102)</td>
</tr>
<tr>
<td>Mathematics</td>
<td>A, B, or C</td>
<td>4 credits and placement out of one first-year writing seminar</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 credits (excluding Arts and Sciences students)</td>
</tr>
<tr>
<td>Music</td>
<td>A or B</td>
<td>4 credits and placement out of MATH 106 and 111. Students may obtain more credit by taking the Mathematics Department placement exam.</td>
</tr>
<tr>
<td>Philosophy</td>
<td>A or B</td>
<td>by departmental examination</td>
</tr>
<tr>
<td>Physics</td>
<td>A or B</td>
<td>3 credits</td>
</tr>
</tbody>
</table>

4 additional credits for PHYS 213 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 116. If students take 116, they do not receive 4 credits for 112. If students take 217, they do not receive credit for 213.
English
Separate from AP credit for a high score on the CEEB SAT II examination in English, students who have taken an AP English Literature exam and receive scores of 700 or better on the CEEB SAT II examination in literature, or 4 or 5 on either CEEB Advanced Placement English Literature or CEEB Advanced Placement English Composition exams, are eligible to enroll, pass the placement examination in English Composition, and be placed into ENGL 111 or 112, the first course of 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 Arts and Sciences section of this catalog. Students who have had a year of formal study or substantial informal study since they last took a placement test should take the examination 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 three credits, and are eligible to take the Cornell Advanced Standing Examination (CASE).
2) Students who achieve a minimum score of 55 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 three credits.
3) For formal language work at an accredited college, credit is considered by the relevant department on submission of a syllabus and transcript. Sometimes an exam score or the CASE is also required.
4) Native speakers of languages other than English may, if an examination by the appropriate department is available, be granted a maximum of three credits for proficiency equivalent to that required in English for a first-year writing seminar.

Information about times and places of placement tests is available in the orientation booklet and from Academic and Career Counseling Services on the web at sac.cornell.edu/orientation.htm. For more information, see the College of Arts and Sciences section on language course placement, or contact Gallean Hille, 303 Morrill Hall, for French, Italian, and Spanish; Miriam Zubiil, 185 Goldwin Smith Hall, for German; Doreen Silva, 226 Morrill Hall, for Russian; Munther Younes, 409 White Hall, for Arabic. English for a first-year writing seminar.

Music
Advanced placement and credit are awarded only in music theory, and only on the basis of an examination administered by the Department of Music; that is, credit cannot be earned on the basis of the AP IB, or other examinations from outside Cornell, nor on the basis of course work done elsewhere. Outstanding performance on the departmental examination will earn students three credits and placement directly into MUSIC 152 Tonal Theory II. In rare instances students may place into MUSIC 251, in which case they will earn six credits. The placement examination is normally administered on the Sunday during fall orientation week. 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 during orientation week. Full semester appointment required). For information about the departmental examination, students should contact the director of undergraduate studies, 101 Clark Hall, or the department chair, 109 Clark Hall.

Physics B—Students earning a score of 5 may receive eight credits for noncalculus-based PHYS 101 and 102. Those earning a score of 5 in the CEEB AP test, students who receive scores in PHYS 112 or 207 instead of eight credits in PHYS 101 and 102. Those earning a score of 4 will receive four credits in PHYS 101.

Physics C—Mechanics: Students earning a score of 4 or 5 may receive four credits for PHYS 112 or 207, or placement into PHYS 116, a more analytic first-semester course, with no AP credit.

Physics C—Electricity and Magnetism: Students earning a score of 5 may receive four credits for PHYS 215.

Students may not accept 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 101, 112, 116, 207
PHYS 102, 208, 213, 217

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

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

General information and advice may be obtained from the director of undergraduate studies, 101 Clark Hall, or from the Department of Physics, 109 Clark Hall.

University Registration
University registration is the official recognition of a student's relationship with the university and is the basis 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. Unregistered, 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: Cornell University Health Services, or the Bursar.

Individuals must become registered students by the end of the third week of the semester or they will be subject to a financial penalty. 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. The university does not permit retroactive registration and does not record courses or grades for unregistered persons.

### COURSE ENROLLMENT

Pre-course enrollment for each semester at Cornell takes place partway through the preceding semester. Dates are announced in advance and are posted in school and college offices. Students are expected to meet with their advisers during this period to affirm that the courses they plan to take will ensure satisfactory progress toward a degree.

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

### COURSE ADD/DROP/CHANGE

Students may adjust their schedules during add/drop/change periods. Courses may be added, dropped, or changed online through "Just the Facts." 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 adviser 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, and the Department of Physical Education and Athletics 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>No fee</td>
<td>No fee</td>
</tr>
<tr>
<td>Physical education</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.

### 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: Cornell University Health Services.

### 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 (255-4386).

### Bursar Information

#### Tuition, Fees, and Expenses

**Tuition for Academic Year 2004-2005**

- **Endowed Divisions**
  - Undergraduate: $30,000
  - Graduate: $34,400

- **Professional**
  - Law School: $35,280
  - New York resident: $34,590
  - Nonresident: $34,430
  - Contract Divisions (tuition rates are tentative)
    - Undergraduate: $17,970
    - Veterinary Medicine: $20,500
    - New York State resident DVM: $29,000
    - Nonresident DVM: $18,000

- **Graduate and Professional Students**
  - Graduate School (with chair in a contract college): $17,970
  - Veterinary Medicine: $20,500
  - New York State resident DVM: $29,000
  - Nonresident DVM: $18,000

- **Student Activities Fee**
  - Undergraduate students: $167
  - Graduate and professional students: $62

- **Summer Session (2004)**
  - per credit: $760
In Absentia Fees

<table>
<thead>
<tr>
<th>Level</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</td>
<td>$15 per term</td>
</tr>
<tr>
<td>Graduate and professional</td>
<td>$200 per term</td>
</tr>
<tr>
<td>Law and management</td>
<td>$75 per term</td>
</tr>
</tbody>
</table>

Excess-Hours Tuition

$664.23 per credit hour

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 by 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 2004 semester is June 1, 2004. The deadline for the Spring 2005 semester is November 1, 2004. Further information and an application can be found on our web site at www.bursar.cornell.edu.

New contract college undergraduate nonresident students are defined as:

- new entering students (i.e., freshmen).
- new transfers from external colleges (including transfers from two-year institutions with which Cornell has transfer agreements).
- new transfers from an endowed Cornell college to a contract college.
- students who have deferred entry of more than one semester.
- returning students who had withdrawn from the university.
- graduates who are returning for additional degrees.
- students who have taken a leave of absence for more than one year.

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

Fees and Expenses

Undergraduate applicants to Cornell pay a nonrefundable $65 application fee when submitting an application for admission. The Graduate and Law School application fee is $65. Application to the Johnson Graduate School of Management costs $200 for MBA applicants and $65 for Ph.D. applicants.

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 term 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**

<table>
<thead>
<tr>
<th>Fall 2004</th>
<th>Spring 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td></td>
</tr>
<tr>
<td>no charge</td>
<td>8/24–8/30</td>
</tr>
<tr>
<td>10% charge</td>
<td>8/31–9/6</td>
</tr>
<tr>
<td>20% charge</td>
<td>9/7–9/20</td>
</tr>
<tr>
<td>30% charge</td>
<td>9/21–9/27</td>
</tr>
<tr>
<td>40% charge</td>
<td>9/28–10/4</td>
</tr>
<tr>
<td>50% charge</td>
<td>10/5–10/11</td>
</tr>
<tr>
<td>60% charge</td>
<td>10/12–10/18</td>
</tr>
<tr>
<td>80% charge</td>
<td>10/19–10/25</td>
</tr>
<tr>
<td>100% charge</td>
<td>10/26</td>
</tr>
</tbody>
</table>

BILLING AND PAYMENT

**Billing**

Tuition and room and board charges will be billed in July and December and must be paid prior to registration. The due date for these semester bills will normally be five to ten working days prior to registration day. All other charges, credits, and payments will appear on monthly statements mailed before the middle of the month. 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 bills are due by the date stated on the bill; all payments must be received by that date to avoid finance charges. Payments are not processed by postmark. Please inform the Office of the Bursar of any change in billing address. Address changes made at other offices will not change the billing address. The address initially used on billing statements will be the home address as listed on each student’s application for admission.

**Payments**

An individual who has outstanding indebtedness to the university will not be allowed to register or reenroll 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.


E-mail: uco-bursar@cornell.edu; web site: www.bursar.cornell.edu.

**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. Graduates leaving mid-year may be eligible to purchase a five-month plan. Students enrolled in the SHIP may enroll their eligible dependents for an additional cost (fall deadline: September 30). Graduate and professional students who prefer to pay monthly must enroll in the installment payment plan no later than September 30. Because of policy restrictions, the plan is nonrefundable (except for dependents who no longer meet eligibility requirements and students who withdraw from Cornell within the first 30 days of the academic year).

For more information, contact the:

Cornell Student Health Insurance Office
409 College Avenue, Suite 211
Ithaca, NY 14850, USA
Telephone: 607-255-6363
E-mail: sicu@cornell.edu
Web site: www.gannett.cornell.edu/student_insurance

**Class Attendance, Meeting Times, and Examinations**

CLASS ATTENDANCE AND ABSENCES

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

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

### Class Meeting Times

**Monday/Wednesday**

<table>
<thead>
<tr>
<th>Start Times</th>
<th>End Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 MIN</td>
<td>08:00 A.M. to 09:55 A.M.</td>
</tr>
<tr>
<td>75 MIN</td>
<td>08:40 A.M. to 10:55 A.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>09:05 A.M. to 11:55 A.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>10:10 A.M. to 11:50 A.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>11:15 A.M. to 12:55 P.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>12:20 P.M. to 02:55 P.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>01:25 P.M. to 02:55 P.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>02:30 P.M. to 04:25 P.M.</td>
</tr>
<tr>
<td>75 MIN</td>
<td>02:55 P.M. to 04:50 P.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>03:35 P.M. to 04:25 P.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>03:35 P.M. to 04:25 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. to 09:55 A.M.</td>
</tr>
<tr>
<td>75 MIN</td>
<td>08:40 A.M. to 10:55 A.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>09:05 A.M. to 11:55 A.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>10:10 A.M. to 11:50 A.M.</td>
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<tr>
<td>50 MIN</td>
<td>11:15 A.M. to 12:55 P.M.</td>
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<tr>
<td>75 MIN</td>
<td>11:40 A.M. to 12:55 P.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>12:20 P.M. to 01:10 P.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>01:25 P.M. to 02:15 P.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>02:30 P.M. to 03:20 P.M.</td>
</tr>
<tr>
<td>75 MIN</td>
<td>02:55 P.M. to 04:10 P.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>03:35 P.M. to 04:25 P.M.</td>
</tr>
</tbody>
</table>

NO EVENING CLASSES

Friday

<table>
<thead>
<tr>
<th>Start Times</th>
<th>End Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 MIN</td>
<td>08:00 A.M. to 09:55 A.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>09:05 A.M. to 09:55 A.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>10:10 A.M. to 11:00 A.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>11:15 A.M. to 12:05 P.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>12:20 P.M. to 01:10 P.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>01:25 P.M. to 02:15 P.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>02:30 P.M. to 03:20 P.M.</td>
</tr>
<tr>
<td>50 MIN</td>
<td>03:35 P.M. to 04:25 P.M.</td>
</tr>
</tbody>
</table>

NO EVENING CLASSES

<table>
<thead>
<tr>
<th>Laboratories and similar exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 HR 55 MIN</td>
</tr>
<tr>
<td>08:00 A.M. to 09:55 A.M.</td>
</tr>
<tr>
<td>10:10 A.M. to 12:05 P.M.</td>
</tr>
<tr>
<td>12:20 P.M. to 02:15 P.M.</td>
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<tr>
<td>02:30 P.M. to 04:25 P.M.</td>
</tr>
<tr>
<td><strong>(Mon. and Wed.)</strong> 07:30 P.M.</td>
</tr>
<tr>
<td>09:25 P.M.</td>
</tr>
<tr>
<td>2 HR 25 MIN</td>
</tr>
<tr>
<td>07:30 A.M. to 09:55 A.M.</td>
</tr>
<tr>
<td>10:10 A.M. to 12:35 P.M.</td>
</tr>
<tr>
<td>02:00 P.M. to 04:25 P.M.</td>
</tr>
<tr>
<td><strong>(Mon. and Wed.)</strong> 07:30 P.M.</td>
</tr>
<tr>
<td>09:55 P.M.</td>
</tr>
<tr>
<td>3 HR 25 MIN</td>
</tr>
<tr>
<td>08:00 A.M. to 11:00 A.M.</td>
</tr>
<tr>
<td>10:10 A.M. to 01:10 P.M.</td>
</tr>
<tr>
<td>01:25 P.M. to 04:25 P.M.</td>
</tr>
<tr>
<td><strong>(Mon. and Wed.)</strong> 07:30 P.M.</td>
</tr>
<tr>
<td>10:30 P.M.</td>
</tr>
</tbody>
</table>

No classes or laboratory exercises are to be held between the hours of 4:25 P.M. and 7:30 P.M. Monday through Thursday, after 4:25 P.M. on Friday, and after 12:20 P.M. on Saturday, and all day Sunday.

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 term.

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 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 in the Course and Time Roster and the Course and Room Roster, both of which are published through the Office of the University Registrar each semester and on the web at www.cornell.edu/Academic/class.html.

#### 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 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 term 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:

- **a)** 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.
- **b)** 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.
- **c)** 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 term, 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, 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
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 year-long course. The grades of INC and R do not have quality-point equivalents attached. These are the quality-point equivalents:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>A+</td>
<td>4.3</td>
</tr>
<tr>
<td>A-</td>
<td>4.0</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>B+</td>
<td>3.3</td>
</tr>
<tr>
<td>B-</td>
<td>3.0</td>
</tr>
<tr>
<td>C</td>
<td>2.0</td>
</tr>
<tr>
<td>C+</td>
<td>2.3</td>
</tr>
<tr>
<td>C-</td>
<td>2.0</td>
</tr>
<tr>
<td>D</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Courses so designated in the course catalog after approval by the Educational Policy Committee. (c) Freshmen may not exercise the S-U option. (d) Only one optional S-U course is allowed per semester.

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

Arts and Sciences. (a) Courses that count toward satisfaction of major requirements should not be taken for an S or U grade unless the department grants permission. (b) Permission of instructor. (c) 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. (a) May take one Humanities and Social Sciences, Approved, or Free Elective per term after completing first semester. (b) This option may be elected during Pre-Course Enrollment or with the written permission of the instructor and advisor on an add/drop form in the first three weeks of classes. (c) Decision is irrevocable after first three weeks of term.

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

Hotel. (a) Maximum of four free-elective credit hours per term. (b) Exceptions are by petition only.

Human Ecology. (a) Not part of student's major. (b) May be used in the 19 credit hours required outside the major in Human Ecology courses. (c) Not part of hours required in humanities, natural sciences, and social sciences. (d) A department may approve S-U grading in specific courses if approved by Educational Policies Committee. (e) Freshmen enrolled in ENGL 137 and 138, which are only offered for S-U credit, are permitted to apply these courses to the freshman seminar requirements. (f) Total of 12 credits in S-U courses (not counting physical education) may be counted towards degree requirements during a student's college career.

Industrial and Labor Relations. (a) This option may be elected, if available in ILR electives, or in out-of-college electives but not including directed studies. (b) Degree requirements include a minimum of 105 lettergrade (A+ to D-) credits. (c) Student must also be in good standing. (d) A "U" is considered the equivalent of an "F" in determining a student's academic status. (e) Limited to two courses per term, not to exceed four hours in any one course.

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

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 term.

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 term.

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. (a) Must have 100 credit hours with A, B, C, D grades. (b) The S-U option is available only in those

Veterinary Medicine. (a) 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. (b) 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 both 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 can be obtained through the Office of the University Registrar, B7 Day Hall.

University Requirements for Graduation

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

Classes

All undergraduate students must complete two terms 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 terms 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 term, 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 Cornell University 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 University Faculty Committee on Physical Education has established a basic swimming and water safety competency requirement for all entering freshman undergraduate students. Normally, the test is given for women in the Helen Newman pool and for men in the Teagle pool as part of their orientation process. The test consists of a feet-first entry into the deep end of the pool and a continuous 75-yard swim using front, back, and optional strokes. Any student who cannot pass the swim test is required to include the course Basic Swimming and Water Safety in his or her program of physical education before electives can be chosen. Students will receive a grade of incomplete in Physical Education until they have passed the swim test or fulfilled the requirement by satisfactory attendance in two terms of Basic Swimming and Water Safety. Students unable to meet the swim requirement because of medical, psychological, or religious reasons must petition the University Faculty Committee on 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.

Student Records Policy

Under the Family Educational Rights and Privacy Act of 1974 (FERPA), Cornell University is required to advise students of the right to inspect and review their education records. Education records include records directly related to a student and maintained by an educational institution or party acting on its behalf. The university may not disclose such records unless the student has given written consent.

Student or administrative committees

The most recent student educational records from previous educational agency or institution

Financial arrangements between the student and the university

Any other education record containing personally identifiable information

For further information, please refer to the revised Policy on Access to and Release of Student Education Records on the web at www.univco.cornell.edu/policy/asi.html.

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 entitled the Code of Academic Integrity and Acknowledging the Work of Others is distributed to new and transfer students and is also available from the office of the dean of faculty. The policy is published in the Policy Notebook, available free of charge from the office of the dean of students.

PROTECTION OF HUMAN SUBJECTS IN RESEARCH

The University Committee on Human Subjects is the official review board for all university projects that use humans as research subjects, assuring compliance to federal regulations protecting human subjects in research at universities. A human subject is defined by federal regulations as "a living individual about whom an investigator obtains data through intervention or interaction with the individual, or identifiable private information." Projects affected by regulation 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. All proposals involving human subjects in any category, including those initiated by students, must be submitted to the University Committee on Human Subjects for review before the research project begins. The guidelines for the use of human subjects in research are available at www.osp.cornell.edu/Compliance/UCHS/homepageUCHS.htm. Inquiries and communications about the guidelines should be directed to the committee's coordinator, 115 Day Hall (255-5138).
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).

Students should contact the Occidental Medicine Office of Gannett, Cornell University Health Services, or their personal health care provider, prior to working with animals or entering an animal facility, if they may have any medical conditions that may increase their risk.

Guidelines for Faculty and Students with Respect to the Use of Animals in Instruction

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

Guidelines

1. For demonstrating certain principles and procedures, the use of animals in teaching is recognized as an invaluable, often essential, pedagogical device.
2. For courses in which vertebrate animals are to be used in dissection, surgery, or in other experimental procedures, the course description that appears in Courses of Study should alert students to this fact.
3. A detailed description of the intended use of vertebrate animals should be available to students upon request to the instructor of each course.
4. Faculty members are encouraged to explain their reasons and need for using vertebrate animals and should indicate to students the availability of the procedures described in item 8 below.
5. Students are encouraged to discuss their concerns about the instructional use of vertebrate animals with the instructor of the course.
6. When consistent with pedagogical objectives, faculty members are encouraged to consider adopting alternative methods and procedures that do not involve the use of live animals.
7. When students object on ethical or other valid grounds to participating in an exercise using vertebrate animals, instructors are encouraged to provide alternative means when consistent with pedagogical objectives for learning the same material.
8. A student who is reluctant to voice his or her concerns about animal use in a particular course or who thinks these concerns have not received proper attention may seek assistance from the chair of the Institutional Animal Care and Use Committee (IACUC) at 253-3735 or by e-mail at iacuc@cornell.edu.
9. Faculty members should instruct students in the responsible use of animals. For more information, see www.univc.edu/policy/CURA.for.html.

Interdisciplinary Centers, Programs, and Studies

ANDREW D. WHITE PROFESSORS-AT-LARGE

726 University Avenue (255-0832)

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 visited 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 leading office hours for undergraduate and graduate students. They serve for a six-year term and are full members of the faculty when in residence.

Term Ending in 2005

Jimison, Mae, astronaut
McDonough, William, architect
O'Brien, Stephen J., geneticist
Schechner, Richard, director of performance studies

Term Ending in 2006

Cleese, John, writer and actor
Goldworthy, Andy, sculptor
Sacks, Oliver, physician and writer

Term Ending in 2007

Pretty, Jules, sustainable agriculture ecologist
Short, Roger, reproductive physiologist

Term Ending in 2008

Hölldobler, Bert, zoologist
Subrahmanyan, Sanjay, economic historian

Term Ending in 2009

Behrends, Okko, legal historian
Butler, Judith, cultural theorist
Went, Craig, geneticist

Term Ending in 2010

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

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 Professorship of University Professorship in honor of Cornell's ninth president (1977-'95). 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 minimum of two weeks to engage in a variety of activities including public lectures, ongoing courses, and collaborative research.

Term Ending in 2005

Meier, Richard, architect
Reno, Janet, attorney
Scollinck, Edward M., biomedical scientist

Term Ending in 2006

McKinney, Cynthia, educator and politician
Nye, Bill, science guy
Pilgrin, John, journalist and documentary filmmaker

CENTER FOR APPLIED MATHEMATICS

657 Frank H. T. Rhodes Hall (255-1355)

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

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

Graduate students in the center take courses related to their program of study that are offered by various departments. Below are listed selected courses in applied mathematics in the main areas of research interest of the center's members. Detailed descriptions of these courses can be found in the listings of the individual departments.
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### Mathematical Biology
- BIOE 460: Theoretical Ecology
- BTRY 697: Individual Graduate Study in Biometry and Statistics

### Mathematical Economics
- ECON 619: Econometrics I
- ECON 620: Econometrics II
- ECON 710: Stochastic Economics: Concepts and Techniques

### Numerical Mathematics and Operations Research
- COM S 677: Introduction to Automated Reasoning
- COM S 682: Theory of Computing
- COM S 715: Seminar in Programming
- ECE 423: Computer Methods in Digital Signal Processing
- ECE 625: Scheduling Theory
- OR&IE 559: Introduction to Mathematical Statistics
- OR&IE 561: Queueing Systems: Theory and Applications
- OR&IE 563: Applied Time-Series Analysis
- OR&IE 650: Applied Stochastic Processes
- OR&IE 651: Probability
- OR&IE 662: Advanced Stochastic Processes
- OR&IE 670: Statistical Principles
- OR&IE 671: Intermediate Applied Statistics
- BTRY 408: Theory and Probability
- BTRY 409: Theory of Statistics

### Robotics and Vision
- COM S 664: Machine Vision
- ECE 547: Computer Vision
- ECE 548: Digital Image Processing

### Theoretical/Mathematical Physics/Chemistry
- CHEM 792: Molecular Collision Theory
- CHEM 793: Quantum Mechanics I
- CHEM 794: Quantum Mechanics II
- CHEM 795: Quantum Mechanics III

### Interdisciplinary Centers, Programs, and Studies
- THE MARIO EINAUDI CENTER FOR INTERNATIONAL STUDIES
- 170 Uris Hall (255-6370)

The Mario Einaudi Center for International Studies, established in 1961, aims to encourage and support comparative and interdisciplinary research on international subjects. It is one of the largest and most diverse centers of its kind in the United States. Currently, it includes five U.S. Department of Education Title VI National Resource Centers and 16 other area, development, topical, and educational programs. More than 500 faculty members voluntarily collaborate in the center's programs with well over 300 graduate students involved directly in its international programs. Undergraduate students may choose concentrations in international relations, Latin American studies, modern European studies, East Asian studies, South Asian studies, or Southeast Asian studies. (See also Africana Studies and Research Center, Asian Studies, and International Agriculture for related majors and concentrations.)

Cornell's international programs are poised to anticipate and respond to changing global circumstances and perspectives. 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. As programs gain momentum and recognition to attract their own resources, the center applies its resources to new pilot activities that bring faculty members and students together across traditional disciplines and departmental boundaries.

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

The center promotes graduate students’ overseas field research through an annual competition for travel grants and assistance with other fellowship programs. The Fulbright fellowship program, administered by the center, is available to graduating seniors as well as graduate students.

Cornell is committed to the study of the global community in all its complexity—through a faculty of preeminent scholars and teachers, outstanding research facilities, instruction in more than 40 languages, and a library system that houses 2,500,000 volumes related to international and comparative studies.

For additional information on current programs, publications, and courses, contact:
The Mario Einaudi Center for International Studies
Cornell University
170 Uris Hall
Ithaca, NY 14853–7601 USA
Phone: 607–255–6370
Fax: 607–255–5000
website: www.einaudi.cornell.edu

The Einaudi Center Administration:
Nicholas van de Walle, director
Leilani Peck, associate director
170 Uris Hall

Comparative Muslim Societies Committee:
David Powers, director
386 Rockefeller Hall

East Asia Program (formerly China-Japan Program):
John Whitman, director
140 Uris Hall

Latin American Studies Program:
Mary Roldan, director
190 Uris Hall

South Asia Program:
Alaka Basu, director
170 Uris Hall

Southeast Asia Program:
Saroj C. Kunuvilla, acting director
180 Uris Hall

Institute for African Development:
Muna Ndubisi, director
170 Uris Hall

Institute for European Studies:
Davidd Greenwood, director
120 Uris Hall

International Programs in the College of Agriculture and Life Sciences:
James Haldeman, senior associate director
31 Warren Hall

Berger International Legal Studies:
John Barcelo, director
369 Myron Taylor Hall

International Political Economy:
Jonathan Kirshner, director
B2 McGraw Hall

Gender and Global Change:
Josephine Allen, Rosemary Batt, Mary Jo Dudley, co-directors
190 Uris Hall

International Studies in Planning:
Lourdes Beneria, director
209 West Sibley Hall

Population and Development Program:
Thomas Hirsch, director
335 Warren Hall

Comparative Societal Analysis:
Valerie Bunce, acting director
204 White Hall

Cornell Participatory Action Research Network:
Jane Mt Pleasant, director
450 Caldwell Hall

Peace Studies Program:
Matthew Evangelista, director
130 Uris Hall

Program in International Nutrition:
Edward Froncillo, director
B71 Savage Hall

Program on Comparative Economic Development:
Kaushik Basu, director
458 Uris Hall

Cornell International Institute for Food, Agriculture, and Development:
Norman Uphoff, director
31 Warren Hall

Cornell Food and Nutrition Policy Program:
David Sahn, director
308 Savage Hall

International Relations Concentration:
David Lee, director
248 Warren Hall

CENTER FOR THE STUDY OF INEQUALITY
Office: 363 Uris Hall
Telephone: 607–254–8674
Fax: 607–254–8672
E-mail: inequality@cornell.edu
web site: www.inequality.com

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

Symposia and Lecture Series
The 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 symposia and lecture series is listed on the center’s web site (www.inequality.com).

Research Support
For faculty affiliates of CSI, small seed grants for inequality-related research are available, especially for research that has the potential to attract external funding. The CSI also runs a small grant program that supports graduate and undergraduate research on poverty or inequality. The application deadline for all grants is May 1, 2006 (for further details, see www.inequality.com/support/index.shtml).

Internships
The CSI serves as a clearinghouse for student internships that are relevant to the study of inequality. For a full listing of possible internships, please consult the center’s web site at www.inequality.com/academics/index.shtml.

Dissemination
The working paper series on the center web site assists in disseminating research findings, opinion pieces, and related scholarship from some of the top scholars of inequality in the world. This series can be found at www.inequality.com/publications/index.shtml.

Awards
The CSI presents a Distinguished Book Award and Distinguished Paper Award for publications that significantly advance our understanding of inequality. The recipients are invited each year to Cornell University to present their research (see www.inequality.com/publications/awards.shtml).

Undergraduate Concentration
The inequality concentration allows undergraduate students to supplement their studies for their major with a coherent program of courses oriented toward the study of inequality. The concentration is organized into tracks examining such topics as globalization and inequality; social policy, the ethics of inequality; poverty and economic development; social movements; education and inequality; race and ethnicity in comparative perspective; the family and inequality; and literature, postmodernism, and inequality. The concentration is open to students enrolled in any of the seven Cornell undergraduate colleges. If the requirements of the concentration are met, a special notation to this effect will be recorded on the transcript (see www.inequality.com/academics/undergraduate.shtml for further information).

For more information about CSI, please contact Liz Heitner, executive administrator of CSI (254-8674 or inequality@cornell.edu).

COGNITIVE STUDIES
282 Uris Hall
Telephone: 255–6431
E-mail: cogst@cornell.edu
web site: www.cogstud.cornell.edu

Cognitive studies 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 studies draws primarily from the disciplines of computer science, linguistics, neuroscience, philosophy, and psychology. The field of cognitive studies 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, 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 concentration in cognitive studies 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 "Cognitive Studies Program" in the College of Arts and Sciences section. Contact Linda LeVan (255-6431 or cogst@cornell.edu)

Graduate Programs
Cornell offers a graduate field minor in cognitive studies. Cornell's unique program of graduate training, which seeks to tailor optimal program of study and research for each individual, fosters interdisciplinary committees. It is the norm for students interested in cognitive studies to combine faculty members from such fields as philosophy, computer science, linguistics, psychology, or neurobiology and behavior on common committees. For further information on the graduate field of cognitive studies, contact Shimon Edelman, director of graduate studies, (255-6365, se37@cornell.edu), or Linda LeVan, executive staff assistant, 282 Uris Hall, Office of Cognitive Studies (255-6431, cogst@cornell.edu)

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

CORNELL ABROAD
300 Caldwell Hall
Telephone: 607-255-0224, Fax: 607-255-8700
E-mail: cuabroad@cornell.edu
web site: 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 a transnational world, Cornell Abroad offers a wide range of international study opportunities that reflect the fundamental educational goals and objectives of the university. Study abroad is a continuous experience with study on campus, enabling students to make regular progress toward the degree.

Qualified students study abroad through programs administered by Cornell and other American institutions, and by enrolling directly in foreign universities. Among the many study abroad programs available, students select programs with thoughtful planning and apply with the approval of their colleges and faculty advisers. 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 regularly study in more than forty countries. The following list includes programs chosen frequently by students with college approval; these locations preceded by an asterisk (*) are programs run directly by Cornell.

AFRICA
Botswana, Cameroon, Ghana, Kenya, Madagascar, Tanzania, Uganda: School for International Training
Ghana: University of Ghana (through the Council of International Educational Exchange, CIEE)
Kenya: Wildlife Management (School for Field Studies)
South Africa: Universities of Cape Town and Natal, Organization for Tropical Studies

ASIA
China: Chinese University of Hong Kong; *Cornell FALCON for the spring semester or 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 Harbin
India: School for International Training; St. Stephen's College Delhi (through Brown or Rutgers Universities); CIEE at University of Hyderabad
Japan: *Kyoto Center for Japanese Studies; International Christian University and other universities; IES Tokyo
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)

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, School for International Training; Sydney Internship (Boston University);
New Zealand: Otago and Lincoln Universities in New Zealand

EUROPE
Czech Republic: CERGE at Charles University, CET porogram in Jewish Studies
Denmark: *Denmark's International Study Program (DIS)
France: *EDUCO (Cornell, Duke, and Emory in Paris)
France VII, Paris IV, Paris I Institut d'Etudes Politiques de Paris ('Sciences Po'); Critical Studies Program at the University of Paris (CJEE); Paris Internship (Boston University); IES Omon Business Program
Germany: *Berlin Consortium for German Studies at the Free University of Berlin; Wayne State University in Munich and Freiburg
Greece: College Year in Athens
Ireland: Trinity College Dublin and the National University Colleges of Dublin
Galway, and Cork
Italy: *Bologna Cooperative Studies Program; *Cornell College of Art, Architecture, and Planning Program in Rome; Cornell at Universita di Roma; IES Florence
Netherlands: University of Amsterdam; Leiden University
Russia: St. Petersburg University (CIEE); Moscow International University and other universities (American Council of Teachers of Russian)
Spain: *Cornell-Michigan-Penn program at the University of Seville; various language and culture programs
Sweden: *Swedish Practicum in Childhood, Family, and Social Policy at the University of Gotteborg; The Swedish Program at the University of Stockholm
United Kingdom: *Direct enrollment at: the University of Birmingham; University of Bristol; Cambridge University; City University; University of East Anglia; University of Edinburgh; University of Glasgow; University of Manchester; University of Oxford; University of St. Andrews; University of Sussex; University of Warwick; University of York; University of London: King's College, University College (including the School of Slavonic and East European Studies), Imperial College of Science and Technology, the London School of Economics and Political Science, and the School of Oriental and African Studies, as well as other universities of choice.

Exterally sponsored programs in the UK include the British American Drama Academy, the Arcadia University, Boston, and Rochester University internships; the Marymount College Program at the London College of Fashion; and the Honsard Parliamentary Internship Programme.
Students studying in the United Kingdom enjoy a variety of services, and cultural activities, provided by the Cornell-Brown-Penn UK Centre in London.

LATIN AMERICA, CENTRAL AMERICA, AND THE CARIBBEAN

Argentina and Chile: various university-based study abroad programs, through the Coordinating Programs in the Americas (COPA) of Butler University and the University of Illinois

Belize, Brazil, Chile, Ecuador: School for International Training

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

Cuba: the University of Havana through COPA; School for International Training

Ecuador and Jamaica: 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

MIDDLE EAST AND NORTH AFRICA

Egypt: American University in Cairo

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

Jordan: University of Jordan (JIEE)

Lebanon: American University of Beirut

Morocco: School for International Training

Other Locations

Cornell students are by no means limited to the locations listed above or the programs identified for particular countries. In recent years, they have also studied in Austria, Croatia, Dominican Republic, Finland, Hungary, Mongolia, Poland, Portugal, Switzerland, Turkey, Venezuela, and elsewhere. Although Hawaii is not “abroad,” Cornell Abroad also administers a semester program in Earth and Environmental Systems on the “Big Island” of Hawaii.

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. More than 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 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, 200 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 advisers 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 adviser and the college study abroad adviser. 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 as necessary. 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 2005 semester and the 2005-2006 academic year is February 15, 2005, for all programs except Oxford and Cambridge, for which the deadline to study at those universities for the full year in 2005-2006 is November 1, 2004. Many universities and programs admit on a rolling basis before and after these dates. Students planning to study abroad in the spring semester should initiate the application process during the preceding spring. Early application may improve your chances of admission. In all cases, it is a good idea to check with Cornell Abroad.

Registration, Credit Transfer, and Grades

Students who apply through Cornell Abroad to programs approved by their colleges, as outlined above, remain registered at Cornell during study abroad. They are eligible for financial aid and receive full academic credit for pre-approved courses of study completed with satisfactory grades. Students enroll for a 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 at least two years, or the equivalent 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 coursework 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 adviser 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, prior to 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 programs pay a fixed Cornell Abroad tuition per semester, which covers tuition, housing during term (except in U.K. universities), orientation, program-sponsored trips and events, and administrative and financial aid costs, including emergency medical evacuation and repatriation insurance. 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 cost of operating the programs.

Pending approval by the Board of Trustees, in 2004-2005, the Cornell Abroad tuition for students participating in the Berlin Consortium for German Studies, the Cornell Nepal Study Program, EDUCO (Ennory, Duke, and Cornell in Paris), the Michigan-Cornell-Penn Program in Seville, and the Swedish Practicum at the University of Goteborg is $17,650. The Cornell Field Program in Earth and Environmental Systems in Hawaii is $20,000.

There are three tiers of Cornell Abroad tuition for universities in the United Kingdom: Group 1, University of Cambridge, Oxford, and the King’s College pre-med program, at $16,170 per semester; Group 2, University of Edinburgh, St. Andrews, Imperial College, King’s College, London School of Economics, School of Oriental and African Studies, and University College London, at $14,250; and Group 3, University of Birmingham, Bristol, East Anglia, Glasgow, Manchester, Sussex, Warwick, and York, at $11,000 per semester.

For Denmark’s International Studies Program (DIS), the Cornell Abroad tuition is $16,995 per semester, and for the Kyoto Center for Japanese Studies (KCJS), the tuition is $23,225.
per semester. For the Bologna Cooperative Studies Program (BCSP) the tuition is $13,200 per semester.

Students studying in all other programs in 2004–2005 pay the tuition and other costs charged by their programs and a Cornell international program tuition of $4,090 per semester. The international program tuition covers the direct and indirect costs of study abroad to the university, including financial aid for all study abroad students.

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 and there are also external aid sources.

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 those institutions’ policies 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 administrators 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, 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 some information on travel, summer study, and work abroad. Comprehensive information is provided on the Cornell Abroad web site, which incorporates linkages 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 directors are available at Cornell Abroad for walk-in advising.

College Study Abroad Advisers

Agriculture and Life Sciences: Bonnie Shelley, 140 Roberts Hall; Architecture, Art, and Planning: Jayne LeGro, B-1 West Sibley Hall; Arts and Sciences: Dean Pat Wasylw, 55 Goldwin Smith Hall; Engineering: Dan Maloney Hahn, 167 Olin Hall; Hotel Administration: Cheryl Farrell, 174B Statler Hall; History: Leeann O’Donnell, 101 Ives 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
Telephone: 255–4090
web site: http://ciw.cornell.edu

Cornell in Washington is a program that offers students from all colleges in the university an opportunity to earn full academic credit for a semester of study in Washington, D.C. The aim of the program is to give students a chance to take advantage of the rich resources of the national capital. Washington, as the center of much of the nation’s political energy, is an ideal place to study American public policy and the institutions and processes through which it is formulated and implemented. At the same time, both collections of libraries, museums, theaters, and art galleries offers an opportunity to explore American history, literature, art, and the full range of the American humanistic tradition. Washington’s vast high-technology sector, concentrated in both telecommunications and bio-technology, creates endless opportunities for the study of recent developments and future prospects in those arenas, as well. Cornell in Washington students enroll in one of two core courses—Studies in Public Policy or Studies in the American Experience—take one or two elective courses, conduct individual research projects, and choose externships from more than a thousand positions in government agencies, research institutes, non-profit organizations, and private professional firms and businesses.

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

The Cornell in Washington program is open to qualified juniors and seniors from all colleges, schools, and divisions of the university. Students enroll in one core course, which involves a major research project often carried out in conjunction with an externship. Students also select one or two other seminars from such fields as government, history, economics, history of art, and social policy. All seminars are taught by Cornell faculty and carry appropriate credit toward fulfillment of major, distribution, and other academic requirements. In addition, students work as externs with congressional committee offices, executive-branch agencies, interest groups, arts and research institutions, and other organizations involved in public policy and American culture.

Tuition

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

Housing

Apartments are rented at the Cornell Center during the academic year. All are fully furnished (except for dishes, cookware, towels, and bedding) and reasonably priced by both Washington and Cornell standards. Two students are assigned to each efficiency and three to each one-bedroom apartment. Because of the limited number of spaces and the need for accurate planning, a non-refundable deposit of $150 is required to reserve a space. Students are discouraged from bringing automobiles. The public transportation system, consisting of both bus and subway service, is extensive and convenient to the center, and street parking is not permissible.

Applications

Application forms are available from the Cornell in Washington program office at M101 McGraw Hall. Students may also apply on the Web at ciw.cornell.edu. Applications should be submitted the semester prior to participation.

Information

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

CORNELL INSTITUTE FOR PUBLIC AFFAIRS

294 Caldwell Hall
Telephone: 607–255–8018
Fax: 607–255–5240
E-mail: cipa@cornell.edu
web site: www.cipa.cornell.edu

The Cornell Institute for Public Affairs (CIPA) offers a university-wide two-year program of graduate professional studies leading to a Master of Public Administration (M.P.A.) degree. CIPA prepares leaders for government, for nonprofit organizations, and for institutions in the private sector that interact with both.

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

Faculty

The depth and flexibility of the program is reflected in the growing number of affiliated faculty members. CIPA is not confined within a single school or college, but spans the entire university. More than 100 field faculty members, representing twenty-five departments, welcome CIPA Fellows into their course and design thesis committees. About thirty members of this group, known as the Program Faculty, teach courses taken most frequently by CIPA Fellows. Within this group, the Core Faculty provides instruction in the foundation courses. Core Faculty members include David B. Lewis, CIPA director; City and Regional Planning; Nancy Chau, Applied Economics and Management; Matthew Drennan, City and Regional Planning; Theodore J. Lowi, the John L. Senior Professor of American Institutions in the Department of Government; Kathryn S. March, Anthropology; and Jerome Ziegler, in the Department of Policy Analysis and Management.

M.P.A. Program Flexibility

The two-year Master of Public Administration (M.P.A.) degree program consists of sixteen courses; CIPA Fellows typically take four courses per term 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/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/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 thesis topic, CIPA Fellows choose a thesis advisor from among the more than 100 faculty members in the Field of Public Affairs. The thesis advisor guides the Fellow in thesis 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

The M.P.A. program offers eight concentration options:

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

During the latter half of the first year of course work, CIPA Fellows select a concentration. Concentrations are designed to help students organize and develop a particular area of study. Fellows are encouraged to pursue a broad range of interests within their choice of a concentration.

Internships and/or Off-Campus Study Options

CIPA Fellows are expected to engage in public-affairs work related to their respective areas of concentration during the summer between their first and second years of study. The objective is to gain pragmatic professional experience that will complement a student's formal academic study. CIPA's assistant director for professional development provides assistance to Fellows in finding placements 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. Examples of placements include the following:

• the International Monetary Fund
• the Organization of American States
• the United Nations
• the United States Agency for International Development
• the United States Congress and Senate
• the World Bank
• state, local, and urban municipal governments
• nongovernmental organizations worldwide
• private sector consulting firms

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

• Rome Program
• Cornell in Washington
• Cornell in Nepal Study Program.

Thesis

As a culmination of studies in the M.P.A. program, each Fellow develops and submits a thesis. Typically, the 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. It should include conceptual formulation of important policy issues, analysis of these issues and effective professional explanations of alternative response strategies. The level of work expected for the M.P.A. thesis 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. 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 lecturer to come to campus.
• Point of View (POV): The CIPA Public Affairs television program. POV is a 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 rigorous publishing academic work, and also provides a foundation in professional writing and editing—necessary skills for preparing reports and position papers, and publishing research findings.

Complementary Degrees

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

Accelerated Master's Program

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

Residence Requirement

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

Admission

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

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
- letters of recommendation
- an extensive written statement of purpose

Applicants for whom English is a second language will need to achieve a minimal TOEFL score of 250 (computer based) or 600 (paper based).

CIPA has a policy of rolling admission. For an application or for more information, contact the Cornell Institute for Public Affairs, 294 Caldwell Hall (telephone: 607–255–8018; fax: 607–255–5240; e-mail: cipa@cornell.edu; web site: www.cipa.cornell.edu).

Financial Aid
CIPA students fund their education by drawing on a variety of sources. Although the institute provides some partial fellowships, it is unable to provide full support for any individual student. Fellows often win support from Fulbright, Truman, or World Bank fellowships. 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 concerning CIPA funding are made in March, so those wishing to be considered should complete their application by March 1.

CORNELL PLANTATIONS
One Plantations Road
Telephone: 255–2400
E-mail: plantations@cornell.edu
web site: www.plantations.cornell.edu

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

Cornell Plantations provides unique outdoor laboratories and plant collections for Cornell’s academic programs and research in disciplines such as ecology and evolutionary biology, landscape architecture, ornamental horticulture, and bioengineering. While many of Cornell Plantations’ resources are on or near campus, several thousand acres in and around Tompkins County preserve quality examples of native vegetation and rare plants and animals. The lands include bogs, fens, glens, swamps, wet and dry forests, vernal ponds, and meadows. Arrangements to use these natural areas for classes and research can be made by calling Cornell Plantations.

Cornell Plantations has something for everyone! We’re also the many places that non-horticultural students and faculty members visit for classes ranging from art, literature, and women’s issues, to nutrition.

Credit Courses
Cornell Plantations offers two for-credit courses, HORT 480 (Plantations Fall Lecture Series) and HORT 485 (Public Garden Management). HORT 480 is a 1-credit S/U seminar series offered each fall. HORT 485 is a 3-credit course offered every other spring semester. Cornell Plantations also offers non-credit classes and workshops such as botanical illustration, arts and crafts, gardening techniques, and ecology walks, visit our web site at www.plantations.cornell.edu or call 607–255–2400 for more information.

Internships
Cornell Plantations’ internship program is just for you, the Cornell University student! Since the 1990s, more than sixty university students have been working side by side with Plantations’ knowledgeable staff, learning and having fun. A number of positions in various areas are available each year, beginning after finals in May. All positions strive to build on classroom learning through hands-on work, encouraging students’ interests in horticulture and the natural world. Call 255–2401.

Master’s Program
Cornell Plantations’ Master of Professional Studies program offers fully funded fellowships in public garden management. Visit our web site for program details or call 255–2406.

Planning a Visit
To discover all that is Cornell Plantations, visit our web site at www.plantations.cornell.edu or pick up a map or a copy of the Cornell Plantations Path Guide at the Visitor Resource Center and Garden Gift Shop in the Lewis Education Center just below Tower Road (607–255–2400). The Path Guide and accompanying video are also available at The Cornell Store.

PROGRAM ON ETHICS & PUBLIC LIFE
240 Goldwin Smith Hall
Telephone: 607–255–8515

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 rights, freedom of speech, and privacy. And in politics and government, we wrestle with questions about campaign, 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 & Public Life (EPL) is Cornell’s initiative in the systematic study of the ethical dimension of specific public issues. EPL grew out of a conviction that these questions need something more than abstract philosophical discussion. In addition to the general study of values and principles that goes on in theoretical ethics, universities need to foster ways of thinking about the complex, uncertain, and urgent problems of the real world, ways of thinking that are realistic without sacrificing their ethical character. EPL seeks to enhance and facilitate the discussion of ethical issues by students whose central educational interests lie elsewhere, but whose work and lives will nevertheless confront them with dilemmas and responsibilities for which a university education should prepare them. EPL aims to enrich existing departments with courses that are intellectually and practically fruitful at the same time. It offers a 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 194/GOVT 294 Global Thinking
PHIL 242/GOVT 260 Social and Political Philosophy
PHIL 246/BSOC 206/S&T 206 Ethics and the Environment
PHIL 247 Ethics and Public Life
PHIL 342 Law, Society, and Morality
GOVT 469/PHIL 369 Limiting War: The Morality of Modern State Violence
GOVT 412 Voting and Political Participation
GOVT 460/FGSS 466/LAW 648 Feminism and Gender Discrimination
GOVT 468/PHIL 368 Global Climate and Global Justice
GOVT 491/691 Normative Elements of International Relations

Related Courses
AN SC 414 Ethics and Animal Science
CRP 549 Ethics and Practical Judgment in Planning
ENGRG 360/S&T 360 Ethical and Social Issues in Engineering
GOVT 474/PHIL 446 Topics in Social and Political Philosophy
ILRHB 366 Women at Work
ILRCH 401 My Brother’s Keeper: Volunteering and Philanthropy
ILRCH 482 Ethics at Work
ILRCH 488 Liberty and Justice for All
ILRCH 604 Theories of Equality and Their Application in the Workplace
LAW 655 International Human Rights
LAW 667 Law and Ethics of Lawyering
LAW 718 Ethnic Conflict and International Law
LAW 748 Legal Ethics and Professionalism
MIL S 441 Leadership, Management, and Ethics for Junior Military Officers
NAV S 402 Leadership and Ethics
NBA 578 Business Ethics
NTRES 407 Religion, Ethics, and the Environment
NTRES 411 Seminar in Environmental Ethics
PAM 567 Health and Welfare Policy
PHIL 145 Contemporary Moral Issues
PHIL 151 Philosophy of Sport
PHIL 241 Ethics
PHIL 245 Ethics and Health Care
PHIL 341 Ethical Theory
PHIL 344 History of Ethics: Ancient and Medieval
PHIL 345 History of Ethics: Modern
PHIL 346 Modern Political Philosophy
PHIL 447 Contemporary Ethical 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; Henry Shue, professor of ethics and public life and professor of philosophy.

PROGRAM IN REAL ESTATE
114 West Shelby Hall
Telephone: 607-255-7110

The two-year Master of Professional Studies in Real Estate (M.P.S./R.E) degree program is an interdisciplinary program that combines courses from nearly every college at Cornell University. The degree is designed for aspiring real estate professionals who are in the initial or early stages of their careers. Two entities provide support for the degree program. The Program in Real Estate exists at Cornell University to serve as the integrating organizational unit for the management and administration of academic and industry-related real estate activities on and off campus. The Field of Real Estate is a committee of faculty members selected from several different colleges that is directly involved in and responsible for the design, delivery, and administration of the real estate curriculum.

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

Students take core courses in principles of real estate, the real estate development process, real estate finance and investments, managerial finance, residential development, real estate law, construction planning and operations, design in real estate development, and real estate marketing and management, along with a weekly industry seminar. Elective courses are taken in a chosen area of concentration, and there is a leadership and management distribution requirement. Many concentration options are possible and may be structured from the hundreds of related courses taught at Cornell University (e.g., development, finance, investments, real estate consulting, sustainable development, property and asset management, real estate development, and many other aspects of the real estate business).

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 111 and 112, or MATH 191 and 192
   b. PHYS 207 and 208, or PHYS 112 and 213 if PHYS 214 will also be taken (see below)
   c. CHEM 207 and 208
   d. BIO G 101/105 and 102/104 (or 105-106) or BIO G 100 and 110
   e. THREE ADDITIONAL 3-4 credit courses in basic science and math, generally 100-200-level classes. One or two of the following may be included in the selection:
      EAS 201 Physics and Chemistry of the Earth
      EAS 240 Field Study of the Earth System
      BIOE 261 Ecology and the Environment
   Other examples are MATH 293, MATH 294, MATH 213, biochemistry, organic chemistry (e.g., CHEM 257), PHYS 214, and introductory statistics. With the exception of an introductory statistics course, the additional basic courses should require at least one of the classes listed in 1-4 above as a prerequisite.

2. Science of Earth Systems Core Courses
   EAS 302 Evolution of the Earth System
   EAS 331/ASTRO 331 Climate Dynamics
   EAS 321/NRES 321 Introduction to Biogeochemistry

3. Concentration Courses
   Four intermediate to advanced-level courses (300-level and up) that build on the core courses and have prerequisites among the "Basic Math and Sciences" courses listed above. These classes build depth and provide the student with a specific expertise in some facet of earth system science. Possible areas of concentration include, but are not limited to, Ocean Sciences, Environmental Geology, Climate Dynamics, Biogeochemistry, Ecological Systems, Environmental Biophysics, Hydrological Systems, and Soil Science.

The SES major is available for students in the College of Agriculture and Life Sciences and the College of Arts and Sciences. In the College of Engineering, the SES curriculum may be completed by choosing the SES option in the Department of Earth and Atmospheric Sciences. The SES major has its home in the Department of Earth and Atmospheric Sciences but relies on the collaboration of several departments across the university.

The SES Curriculum

During the past several decades, with the increasing concern about air and water pollution, nuclear waste disposal, the ozone hole, 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 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 twenty-first 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 subdisciplines (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 M.A. level such as environmental consulting and science writing.
- 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.
Department of Statistical Science

301 Malott Hall (255–8066)

M. T. Wells (chair); R. L. Strawderman (director of graduate studies); J. A. Bunge (director of professional programs); K. Atheyea; T. Berger; C. Bustamante; T. DiCiccio; R. Durrett; E. Dyrkin; T. Fine; Y. Hong; J. T. G. Hwang; H. Kesten; N. Kiefer; G. Lawler; M. Nussbaum; P. Proctor; S. Resnick; D. Ruppert; G. Samorodnisky; S. Schwager; B. Turnbull; P. Velleman; T. Vogelsang.

The university-wide Department of Statistical Science at Cornell coordinates activities in statistics and probability at the undergraduate, graduate, and research levels.

Students interested in graduate study in statistics and probability can apply to the Graduate Field of Statistics or to one of the other graduate fields of study that offer related coursework. Students in the Field of Statistics plan their graduate program with the assistance of their Special Committee. For detailed information on opportunities for graduate study, students should contact the Director of Graduate Studies, 301 Malott Hall.

The department also offers an undergraduate program through Biological Statistics and Computational Biology (BSCB) in the College of Agriculture and Life Sciences and an Engineering Statistics minor in the College of Engineering. Undergraduate majors and certificate programs are currently under development for other colleges. For information, contact the Undergraduate Coordinator (301 Malott Hall, 255–8066).

Statistics courses offered by the departments listed below will fill distribution requirements in many of the colleges.

A free consulting service is offered through BSCB in the College of Agriculture and Life Sciences. Statistical computing consulting is available through the Office of Statistical Consulting, B21 Savage Hall, 255–1926.

The department is organized into four units: Biological Statistics, Engineering Statistics, Mathematical Statistics and Probability, and Social Statistics. The areas covered include agricultural statistics, biostatistics, economic and social statistics, epidemiology, manufacturing statistics, quality control and reliability, probability theory, sampling theory, statistical computing, statistical design, statistical theory, and stochastic processes and their applications.

Course Designations

The following course identifiers are used to designate the courses offered by the separate units: Biological Statistics, Engineering Statistics Unit (ENGR); STENGR; Mathematical Statistics Unit (ARTS); STMATH; Social Statistics Unit (ILR and ARTS), STSOC. To enroll in one of the courses, see the listing for the appropriate college.

Descriptions of undergraduate and graduate courses are listed below.

Department of Statistical Science

ST 501–502 Applied Statistical Analysis

This is the two-semester core course for students in the Master of Professional Studies (M.P.S.) degree program in applied statistics in the Department of Statistical Science. Enrollment is limited to students enrolled in the M.P.S. program. The course consists of a series of modules on various topics in applied statistics. Some modules will include guest lectures from practitioners. Parallel with the course, students complete a year-long, in-depth data analysis project.

ST 501 Applied Statistical Analysis

Letter only. Topics include, but are not limited to: statistical computing systems, statistical software packages, statistical graphics, and simulation methods and algorithms.

ST 502 Applied Statistical Analysis

Letter only. Topics include, but are not limited to: sample surveys and questionnaire design, data sources, experimental design, and data mining.

[ST 578 Statistical Methods for Reliability Survival Data]

Prerequisites: OR 270 or equivalent, plus some senior elective-level course in applied statistics such as regression, data mining, or time series. This course provides an introduction to probabilistic and statistical methodology for the analysis of lifetime data. Because of the presence of such features as censoring, skewed distributions, and time-varying covariates, special statistical techniques are required. Topics include: life distributions, life tables, truncation and censoring, Kaplan–Meier estimate, accelerated life tests, Weibull and lognormal regression models, Cox proportional hazards model, regression diagnostics, system reliability, repairable systems reliability, repeated events. Use of statistical computing packages, such as SAS and Splus, is stressed to perform data analyses, although no previous experience is assumed.

ST 600 Statistics Seminar

Fall and spring. I credit. S/U only. Prerequisite or corequisite: BTRY 409 or permission of instructor.

Biological Statistics Unit

S155 401 Biological Statistics I (enroll in BTRY 401)
S155 402 Biological Statistics II (enroll in BTRY 402)
S155 382 Introduction to Statistical Genomics and Bioinformatics (enroll in BTRY 382)
S155 400 Biometry Seminar (enroll in BTRY 400)
S155 408 Theory and Probability (enroll in BTRY 408)
S155 409 Theory of Statistics (enroll in BTRY 409)
S155 482 Statistical Genetics (enroll in BTRY 482)
S155 494 Undergraduate Special Topics in Biometry and Statistics (enroll in BTRY 494)
S155 495 Statistical Consulting (enroll in BTRY 495)
S155 497 Undergraduate Individual Study in Biometry and Statistics (enroll in BTRY 497)
S155 498 Undergraduate Supervised Teaching (enroll in BTRY 498)
S155 499 Undergraduate Research (enroll in BTRY 499)
S155 601 Statistical Methods I (enroll in BTRY 601)
S155 602 Statistical Methods II (enroll in BTRY 602)
S155 603 Statistical Methods III (enroll in BTRY 603)
S155 604 Statistical Methods IV: Applied Design (enroll in BTRY 604)
S155 652 Computationally Intensive Statistical Inference
S155 672 Topics in Environmental Statistics (BTRY 672)
S155 682 Statistical Genomics (enroll in BTRY 682)
S155 694 Graduate Special Topics in Survival Analysis (enroll in BTRY 694)
S155 697 Individual Graduate Study in Biometry and Statistics (enroll in BTRY 697)
S155 717 Linear and Generalized Linear Models (enroll in BTRY 717)
S155 795 Statistical Consulting (enroll in BTRY 795)
S155 798 Graduate Supervised Teaching (enroll in BTRY 798)

Engineering Statistics Unit

S156 310 Introduction to Probability and Random Signals (enroll in ECE 310)
S156 360 Engineering Probability and Statistics II (enroll in OR&E 360)
S156 361 Introductory Engineering Stochastic Processes I (enroll in OR&E 361)
S156 411 Random Signals in Communications and Signal Processing (enroll in ECE 411)
S156 436 A Mathematical Examination of Fair Representation (enroll in OR&E 436)
S156 467 Telecommunication Systems I (enroll in ECE 467)
S156 473 Operations Research Tools for Financial Engineering (enroll in OR&E 473)
S156 474 Statistical Data Mining (enroll in OR&E 474)
S156 476 Applied Linear Statistical Models (enroll in OR&E 476)
S156 512 Fundamental Information Theory (enroll in ECE 562)
S156 517 Feedforward Neural Networks (enroll in ECE 577)
S156 523 Introductory Engineering Stochastic Processes I (enroll in OR&E 523)
S156 560 Engineering Probability and Statistics II (enroll in OR&E 560)
S156 561 Queuing Theory and Its Applications (enroll in OR&E 561)
S156 580 Simulation Modeling and Analysis (enroll in OR&E 580)
S156 650 Applied Stochastic Processes (enroll in OR&E 650)
S156 651 Probability (enroll in OR&E 651)
S156 665 Storage Data Communication Models (enroll in OR&E 665)
S156 670 Statistical Principles (enroll in OR&E 670)
S156 677 Statistical Learning Theory for Data Mining (enroll in OR&E 677)
S156 703 Selected Topics in Applied Probability (enroll in OR&E 703)
S156 778 Selected Topics in Applied Statistics (enroll in OR&E 778)

Mathematical Statistics and Probability Unit

S158 171 Statistical Theory and Application in the Real World (enroll in MATH 171)
S158 311 Introduction to Analysis (enroll in MATH 311)
S158 471 Basic Probability (enroll in MATH 471)
S158 472 Statistics (enroll in MATH 472)
S158 621 Measure Theory and Lebesgue Integration (enroll in MATH 621)
STMATH 671-672 Probability Theory (enroll in MATH 671-672)
STMATH 674 Introduction to Mathematical Statistics (enroll in MATH 674)
STMATH 771-772 Seminar in Probability and Statistics (enroll in MATH 771-772)
STMATH 777-778 Stochastic Processes (enroll in MATH 777-778)

Social Statistics Unit
STSOC 210 Statistical Reasoning I (enroll in ILRST 210)
STSOC 211 Statistical Reasoning II (enroll in ILRST 211)
STSOC 310 Statistical Sampling (enroll in ILRST 310)
STSOC 312 Applied Regression Methods (enroll in ILRST 312)
STSOC 319 Introduction to Statistics and Probability (enroll in ECON 319)
STSOC 320 Introduction to Econometrics I (enroll in ECON 320)
STSOC 321 Applied Econometrics I (enroll in ECON 321)
STSOC 411 Statistical Analysis of Qualitative Data (enroll in ILRST 411)
STSOC 499 Directed Studies (undergraduate) (enroll in ILRST 499)
STSOC 510 Statistical Methods for the Social Sciences I (enroll in ILRST 510)
STSOC 511 Statistical Methods for the Social Sciences II (enroll in ILRST 511)
STSOC 630 Econometrics II (enroll in ECON 630)
STSOC 639 Econometrics I (enroll in ECON 639)
STSOC 721 Time Series Econometrics (enroll in ECON 721)
STSOC 722 Semi/Nonparametric Econometrics (enroll in ECON 722)
ISTSOC 710 Applied Econometrics (enroll in ECON 710)
ISTSOC 711 Time Series Econometrics (enroll in ECON 711)
ISTSOC 739 Advanced Topics in Economics I (enroll in ECON 739)
ISTSOC 799 Directed Studies (Graduate) (enroll in ILRST 799)

Related Courses in Other Departments
AEM 410 Business Statistics
AEM 411 Introduction to Econometrics
AEM 417 Decision Models for Small and Large Business
AEM 710 Econometrics I
AEM 713 Quantitative Methods I
BTRY 421 Matrix Computations
BTRY 726 Problems and Perspectives in Computational Molecular Biology
CEE 594 Engineering Management Methods II: Managing Uncertain Systems
CEE 621 Water-Resources Systems II: Stochastic Hydrology
CHEM 794 Quantum Mechanics
CHEM 796 Statistical Mechanics
COM S 622 Computational Tools and Methods for Finance
COM S 624 Numerical Solution of Differential Equations
COM S 626 Computational Molecular Biology
CRP 321 Introduction to Quantitative Methods for the Analysis of Public Policy
CRP 632 Methods of Regional Sciences and Planning I
ECON 321 Applied Econometrics
GOVT 602 Field Seminar in Political Methodology
GOVT 605 Comparative Methods
HADM 371 Hospital Qualitative Analysis
HD 401 Empirical Research
NS 637 Epidemiology of Nutrition
NS 639 Epidemiology Seminar
NS 641 Applied Regression
OR&IE 674 Statistical Learning Theory for Data Mining
OR&IE 468/568 Financial Engineering with Stochastic Calculus I
OR&IE 469/569 Financial Engineering with Stochastic Calculus II
OR&IE 576 Regression
OR&IE 464/566 Extreme Value Analysis with Applications to Finance and Data Communication
OR&IE 677 Sequential Methods in Statistics
PAM 215 Research Methods
PAM 230 Introduction to Policy Analysis
PAM 423 Risk Management and Policy
PHYS 316 Modern Physics I
PHYS 562 Statistical Physics
PHYS 574 Quantum Mechanics I
PSYCH 472 Multiple Regression
PSYCH 473 General Linear Model
R SOC 619 Research Design II
SOC 507 Basic Problems in Sociology II
SOC 506 Research Methods in Sociology II
T&M 310 Advanced Engineering Analysis I
T&M 311 Advanced Engineering Analysis II
VETPM 664 Introduction to Epidemiology
VETPM 665 Study Design
VETPM 666 Advanced Methods in Epidemiology

PROGRAM IN COMPARATIVE AND ENVIRONMENTAL TOXICOLOGY
Department of Food Science
116 Stocking Hall (255-8008)
The Cornell Program in Comparative and Environmental Toxicology is a broadly based intercollege program facilitated by the Institute for Comparative and Environmental Toxicology (ICET). ICET serves as a focal point for all research, teaching, and cooperative extension activities in the broad interdisciplinary area of environmental toxicology at Cornell and encourages the development of collaborative programs between faculty members in many university departments.

Graduate Studies
The graduate field of environmental toxicology provides training leading to the M.S. or Ph.D. degrees. 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. 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.

Courses
Courses in environmental toxicology are cosponsored by the university's academic departments and are open to all graduate students and to undergraduates who have permission of the instructor. The titles and numbers of these courses are listed below. Details of course content are provided in the catalog under the listings of the cosponsoring department. Further information concerning the program and the development of new courses may be obtained through the director of graduate studies, 116 Stocking Hall, telephone: 255-8008, e-mail: envtox@cornell.edu, web site: instruct1.cs.cornell.edu/research/envtox/

TOX 323 Principles of Toxicology (NTRES 323)
TOX 370 Pesticides and the Environment (ENTOM 370)
TOX 406 Ecological Risk Assessment (NTRES 406)
TOX 437 Eukaryotic Cell Proliferation (BIO S 437)
TOX 490 Insect Toxicology and Insecticidal Chemistry (ENTOM 490)
TOX 607 Ecotoxicology (NTRES 607)
TOX 610 Introductory Chemical and Environmental Toxicology (BIOI 610)
TOX 611 Molecular Toxicology (NS 611)
TOX 625 Nutritional Toxicology (AN SC 625)
TOX 698 Current Topics in Environmental Toxicology (NTRES 698, BIOI 796)
TOX 702 Seminar in Toxicology (NS 702)
TOX 709 Topics in Cancer Cell Biology (VETMM 709)
TOX 899 Master's Thesis and Research
TOX 999 Doctoral Thesis and Research

Related courses in other departments
CE 597 Risk Assessment
FS 621 Food Lipois
Business and Preprofessional Study

UNDERGRADUATE BUSINESS STUDY
Cornell offers an accredited general undergraduate business degree program as well as world-renowned business-related programs in five other colleges and schools. Because the choices are so broad, students are encouraged to explore the offerings carefully to identify the program that best matches their business career goals. (Graduate study is available in the Johnson Graduate School of Management as well as in graduate fields associated with each of the undergraduate options.)

Applied economics and management
The Department of Applied Economics and Management (AEM) in the College of Agriculture and Life Sciences is home to Cornell's general undergraduate business degree. Accredited by AACSB International—The Association to Advance Collegiate Schools of Business, AEM's undergraduate business program offers courses that prepare students for careers in finance, marketing, management, and business strategy. Students also may participate in AEM's specialized programs focusing on entrepreneurship, agribusiness, small business, and food industry management. Courses reflect the program's analytical, applied economics focus. (web site: www.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, arts 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, or economics to prepare for careers in areas such as actuarial science or finance. (web site: www.arts.cornell.edu)

Engineering
Many of today's business managers hold engineering degrees. Each of the College of Engineering's 10 major fields prepares students for business careers. Operations research and engineering is the most business-oriented engineering field, preparing graduates for careers such as investment banking and process engineering. Engineering students in any field can take a business-oriented minor in areas such as industrial systems and information technology, and operations research and management science. (web site: www.engineering.cornell.edu)

Hotel administration
The School of Hotel Administration, the world's leading hospitality management program, prepares students for management and entrepreneurial careers in businesses such as hotels, resorts, restaurants, amusement parks, sports arenas, cruise lines, and airlines. The school offers a rigorous business curriculum with courses in finance and real estate; hospitality facilities and operations; marketing, tourism, strategy, and information systems; and organizational management, communication, and law. The school's 150-room conference hotel gives students the opportunity to apply what they learn in a real-world business. (web site: www.hotelschool.cornell.edu)

Human ecology
The College of Human Ecology offers three business-oriented majors. The textiles and apparel major prepares students for careers in the fashion industry, for example, as a retail executive or merchandise buyer. Students majoring in facility planning and management study interior design, management, environmental psychology, and real estate to pursue careers as facility planners and consultants. The policy analysis and management major offers concentrations focusing on health, consumers, and policy, and its graduates pursue careers as nonprofit managers, consumer advocates, and policy researchers. (web site: www.humec.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, labor law, labor economics, history, and statistics. Students can then develop special interests in management, dispute resolution, negotiation, employee relations, labor unions, collective bargaining, public policy, and international labor issues. Most ILR graduates begin careers in areas such as management, consulting, and public policy, but about one-third go directly into law school. (web site: www.ilr.cornell.edu)

Related Areas
Entrepreneurship and Personal Enterprise Program
This university-wide program is open to all Cornell students interested in eventually starting their own businesses or working for venture capital firms. A series of almost 50 linked entrepreneurship-related courses are offered by the above six colleges and schools as well as by the Johnson Graduate School of Management, the Law School, and the School of Veterinary Science. (web site: epe.cornell.edu)

International programs
Several additional programs allow business students to focus on a particular geographic area. Concentrations are offered in Latin American Studies, Modern European Studies, East Asian Studies, South Asian Studies, Southeast Asian Studies, and African Studies (all in the College of Arts and Sciences). The College of Agriculture and Life Sciences offers an interdepartmental program in international agriculture.

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.

SELECTED BUSINESS AND MANAGEMENT COURSES

Accounting
AEM 221 Financial Accounting
AEM 323 Managerial Accounting
H ADM 123 Financial Accounting Principles
H ADM 422 Taxation and Management Decisions
OR&IE 350 Financial and Managerial Accounting

Agribusiness Management
AEM 302 Farm Business Management
AEM 329 International Agribusiness Study Trip
AEM 346 Dairy Markets and Policy
AEM 403 Farm Management Study Trip
AEM 404 Advanced Agricultural Finance Seminar
AEM 405 Agricultural Finance
AEM 427 Agribusiness Strategy
AEM 431 Food and Agricultural Policies

Communication
COMM 201 Oral Communication
COMM 263 Organizational Writing
COMM 301 Business and Professional Speaking
ENGRC 335 Communications for Engineering Managers
H ADM 165 Managerial Communication I
H ADM 364 Advanced Business Writing

Economics
AEM 200 Contemporary Controversies in the Global Economy
AEM 230 International Trade and Finance (also ECON 230)
ECON 101 Introductory Microeconomics
ECON 102 Introductory Macroeconomics
ECON 313 Intermediate Microeconomic Theory
ECON 331 Money and Credit
ECON 351 Industrial Organization I
ILRLE 240 Economics of Wages and Employment
ILRLE 443 Personnel Economics for Managers (also ECON 443)
PAM 200 Intermediate Microeconomics

Entrepreneurship
AEM 325 Personal Enterprise and Small Business Management
AEM 425 Small Business Management Workshop
CHEM 404 Entrepreneurship in Chemical Enterprise
ENGRI 127 Introduction to Entrepreneurship and Enterprise Engineering (also M&AE 127)
M&AE 461 Entrepreneurship for Engineers (also ENGRG 461 and OR&IE 452)
NBA 300 Entrepreneurship and Enterprise
Finance and Real Estate
AEM 324  Financial Management
AEM 420  Investments
AEM 421  Derivatives and Risk Management
AEM 423  Risk Management in Business
AEM 428  Valuation of Capital Investment
AEM 429  International Finance
ECON 333  Financial Economics
H ADM 125  Finance
H ADM 322  Principles of Investment Management
H ADM 420  Principles of Real Estate
H ADM 424  Securities Analysis and Portfolio Management
ILRLE 240  Economics of Wages and Employment
OR&IE 451  Economic Analysis of Engineering Systems

Hospitality Management
H ADM 105  Introduction to Lodging
H ADM 106  Introduction to Food Service Operations
H ADM 236  Culinary Theory and Practice
H ADM 255  Hotel Development and Planning
H ADM 275  Information Technology for Hospitality Managers
H ADM 305  Restaurant Management
H ADM 321  Hospitality Financial Management
H ADM 387  Business and Hospitality Law

International Business
AEM 335  International Technology Marketing of Biotechnology
AEM 430  International Trade Policy
AEM 432  Business and Governments in a Global Marketplace
AEM 442  Emerging Markets
AEM 449  Global Marketing Strategy
ECON 362  International Monetary Theory and Policy
ILRHR 456  International Human Resource Management

Law and Regulation
AEM 320  Business Law I
AEM 321  Business Law II
AEM 422  Estate Planning (also NBA 562)
COMM 428  Communication Law
ECON 354  Economics of Regulation
GOVT 389  International Law
H ADM 422  Taxation and Management Decisions
H ADM 487  Real Estate Law
H ADM 489  The Law of the Internet and e-Commerce
ILRCB 201  Labor and Employment Law
PAM 204  Economics of the Public Sector
PAM 340  The Economics of Consumer Policy
PAM 341  Economics of Consumer Law and Protection

Management
AEM 220  Introduction to Business Management
AEM 322  Technology, Information, and Business Strategy
AEM 327  Technological Change and Innovation Strategy
AEM 328  Innovation and Dynamic Management (also H ADM 449)
AEM 424  Management Strategy
AEM 443  Food Industry Strategy
AEM 555  Environmental Management and Policy
ENGRC 323  Engineering Economics and Management
H ADM 412  Managing Organizational Change
H ADM 441  Strategic Management
ILRHR 464  Business Strategy
PAM 220  Introduction to Management: Principles and Differences among Sectors
PAM 334  Corporations, Shareholders, and Policy
PAM 423  Risk Management and Policy

Marketing
AEM 240  Marketing
AEM 448  Food Merchandising
COMM 272  Principles of Public Relations and Advertising
H ADM 343  Marketing Research
H ADM 347  Consumer Behavior
H ADM 448  Marketing Communications
PAM 223  Consumer Markets
PAM 323  Consumer Markets II
NCC 503  Marketing Management

Organizational Behavior, Human Resource Management, and Sociology
H ADM 115  Organizational Behavior and Interpersonal Skills
H ADM 210  The Management of Human Resources
H ADM 412  Managing Organizational Change
ILRRCB 300  Collective Bargaining
ILRHR 260  Human Resource Management
ILRHR 362  Career Development: Theory and Practice
ILRHR 462  Staffing and Organizations
ILRHR 463  Diversity and Employee Relations
ILROB 170  Introduction to Micro Organizational Behavior and Analysis
ILROB 171  Introduction to Macro Organizational Behavior and Analysis
ILROB 329  Organizational Cultures
ILROB 370  The Study of Work Motivation
SOC 203  Work and Family (also FGSS 203)

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 direct relation to law and their influence on its development and ethics, and philosophy, because of the influence of philosophic reasoning on legal reasoning and jurisprudence. Psychology and human development lead to an understanding of human nature and mental behavior. Some knowledge of the principles of accounting and of the sciences such as chemistry, physics, biology, and engineering is recommended and will prove of practical value to the lawyer in general practice in the modern world.
3. Cultural subjects, though they may have no direct bearing on law or a legal career, will expand students' interests; help cultivate a wider appreciation of literature, art, and music; and make better-educated and well-rounded persons.

4. Certain subjects are especially useful in specialized legal careers. For some, a broad scientific background—for example, in agriculture, chemistry, physics, or engineering—when coupled with training in law, may furnish qualifications necessary for specialized work with the government, for counseling certain types of businesses, or for a career as a patent lawyer. A business background may be helpful for those planning to specialize in corporate or tax practice. Students who anticipate practice involving labor law and legislation might consider undergraduate study in the School of Industrial and Labor Relations. Whatever course of study is chosen, the important goals are to acquire perspective, social awareness, and a critical cast of mind; to develop the ability to think logically and analytically; and to express thoughts clearly and forcefully. These are the crucial tools for a sound legal education and a successful career.

The College of Human Ecology offers a program that 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 Health Careers Program, Cornell Career Services, 103 Barnes Hall, Ithaca, New York 14853-1601.

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 specific preveterinary program at Cornell, and students interested in veterinary medicine as a career should select a major for study that fits their interests while at the same time meeting the entrance requirements for veterinary college as listed below. Most preveterinary students at Cornell are enrolled in the College of Agriculture and Life Sciences, which offers several applied science majors, including animal science, that can lead to related careers if the student does not go to veterinary college. Some enter other divisions of the university, especially the College of Arts and Sciences, because of secondary interests.

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 brochures Admissions Information, obtained by writing to the Office of DVM Admissions, College of Veterinary Medicine, Cornell University, S2-009 Schurman Hall, Ithaca, New York 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 Health Careers Program, Cornell Career Services, 103 Barnes Hall, Ithaca, New York 14853-1601.
ADMINISTRATION
Susan A. Henry, dean
William E. Fry, senior associate dean
John M. Finamore, associate dean for financial affairs
Mary Lou Doyle, assistant dean for human resources
Michael P. Riley, assistant 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
Daniel J. Decker, associate dean and director of the Cornell University Agricultural Experiment Station
Max J. Pfeffer, associate director of the Cornell University Agricultural Experiment Station
Susan J. Riha, director for sponsored research in the senior associate dean’s office
Helene R. Dillard, associate dean and director of cooperative extension
Edward D. Harwood, associate director of cooperative extension
Michael P. Hoffmann, associate director of cooperative extension
W. Ronnie Coffman, director of international programs
Norman T. Uphoff, director of Cornell International Institute for Food, Agriculture, and Development
James E. Haldeman, associate director of international agriculture
Terry W. Tucker, associate director of international agriculture

Office of Academic Programs Staff
Counseling and advising: Lisa Ryan, Bonnie Shelley, Pamela Torelli
Registrar: Melanie Holland, Amy Paolangeli, Cheryl Boyer, Elisa Rufferty
Admissions: Ann LiFave, Tara Weaver, Lorie Fessenden, Missy Salmi
Career development: Amy Benedict-Augustine, Laurie Gillespie, Pamela Dusseau, Sharon Radcliffe
Multicultural and diversity programs: Catherine Thompson

Department Chairs
Applied economics and management: W. H. Lesser, Warren Hall
Animal science: A. W. Bell, Morrison Hall
Atmospheric science unit (part of Earth and Atmospheric Sciences): S. J. Golucci, Bradfield Hall

DEGREE PROGRAMS
The College of Agriculture and Life Sciences offers programs leading to the degrees of 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.

Graduate Degrees
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.

Agriculture (M.P.S. [Agr.]): D. R. Viands, Roberts Hall
Agricultural and Biological Engineering: D. J. Aneshansley, Riley-Robb Hall
Agricultural Economics: D. R. Lee, Warren Hall
Animal Breeding: E. J. Pollak, Morrison Hall
Animal Science: R. L. Quaas, Morrison Hall
Atmospheric Sciences: D. S. Wilks, Bradford Hall
Biochemistry, Molecular, and Cell Biology: W. J. Brown, Biotechnology Building
Biometry: M. Wells, Warren Hall
Communication: B. V. Lewenstein, Kennedy Hall
Development Sociology: C. C. Geisler, Warren Hall
Ecology and Evolutionary Biology: D. W. Winkler, Corson Hall
Education (also M.A.T.): D. E. Schrader, Kennedy Hall
Entomology: E. Shields, Comstock Hall
Environmental Toxicology: A. Yen, Rice Hall
Food Science and Technology: H. T. Lawless, Storck Hall
Genetics and Development: K. J. Kemphues, Biotechnology Building
Horticulture: N. L. Bassuk, Plant Science Building
International Agriculture and Rural Development (M.P.S. Agr.): S. C. Kyle, Warren Hall
International Development: N. T. Uphoff, Warren Hall
Landscape Architecture (M.A.L.): D. W. Krall, Kennedy Hall
M.P.S. Agriculture with Peace Corps Option (offered by most agriculture fields with M.P.S. programs): J. Haldeman, Warren Hall or see director of graduate studies for chosen field
Microbiology: S. C. Winans, Wing Hall
Natural Resources: M. E. Krasny, Fenow Hall
Neurobiology and Behavior: C. D. Hopkins, Seeley-Mudd Hall
Nutritional Sciences: M. N. Kazarinoff, Martha Van Rensselaer Hall
Physiology: M. S. Roberson, Vet Research Tower
Plant Biology: J. B. Nasrallah, Plant Science Building
Plant Breeding: E. D. Earle, Bradfield Hall
Plant Pathology: E. B. Nelson, Plant Science Building
Plant Protection (M.P.S. Agr.): W. H. Reissig, Geneva Campus
Soil and Crop Sciences: H. van Es, Bradfield Hall
Statistics: R. Strawderman, Malott Hall
Zoology: J. W. Hermanson, Vet Research Tower

Bachelor of Science Degree

Departments in the College of Agriculture and Life Sciences sponsor study for the B.S. degree in twenty-one 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 adviser in each major. Course requirements for double majors may overlap. The Counseling and Advising office (140 Roberts Hall) and department representatives have a form for students to complete to officially recognize the double major. The following units offer major fields of study for undergraduates. A faculty advising coordinator is listed for each unit. Students should consult with the faculty coordinator regarding requirements and opportunities for concentrations in the major.

Animal Sciences: W. Bruce Currie, 434 Morrison Hall
Atmospheric Science: Mark Wysocki, 1114 Bradfield Hall
Biological Engineering: James Bartsch, 314 Riley-Robb Hall
Biological Sciences: Jeffrey Doyle, 216 Stimson Hall; Bonnie Cornella, 216 Stimson Hall
Biology and Society: Douglas Gurak, 234 Warren Hall
Biometry and Statistics: Steven Schwager, 424 Warren Hall
Communication: Brian Earle, 328 Kennedy Hall
Crop and Soil Sciences: Gary Fick, 507 Bradfield Hall
Development Sociology: Tom Hirschl, 333 Warren Hall
Education: Leigh Henshey, 418 Kennedy Hall
Entomology: Bobbi Peckarsky, 3134 Comstock Hall
Food Science: Janice Brown, 107 Storck Hall
Information Science: Dana Brown, 303 Upson Hall
International Agriculture and Rural Development: Terry Tucker, 35 Warren Hall
Landscape Architecture: Peter Trowbridge, 440 Kennedy Hall
Natural Resources: Tim Fahey, 12 Fenow Hall
Nutrition, Food, and Agriculture: J. Thomas Brenna, B38 Savage Hall; Elise West, 334 MVR Hall
Plant Sciences (Plant Biology, Plant Genetics and Breeding, Horticulture, Pathology, Protection): Don Vardar, 140 Roberts Hall
Science of Earth Systems: Susan Riba, 1110 Bradfield Hall
Science of Natural and Environmental Systems: Tim Fahey, 12 Fenow Hall
Special Programs in Agriculture and Life Sciences: Lisa Ryan, 140 Roberts Hall

Minors

Students in the College of Agriculture and Life Sciences may pursue one or more minor fields of study. Minor fields of study do not require an academic adviser, but each minor field will have 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 offer minors. Minors available at the printing of this catalog are listed below with contact person and e-mail address:

Animal Science: Deloris Bevins, dgb1@cornell.edu
Atmospheric Science: Mark Wysocki, mw3@cornell.edu

Communication

Linda Van Buskirk
lpw1@cornell.edu
Brian Earle
boe1@cornell.edu

Development Sociology

Tom Hirschl
tah1@cornell.edu
Renee Hoffman
rnh6@cornell.edu

Education

Betty Heath-Camp
bh76@cornell.edu

Entomology

Bobbi Peckarsky
bp1@cornell.edu

Food Science

Janice Brown
jmbl4@cornell.edu

Information Science

Geri Gay
ggki@cornell.edu

International Studies

Kenna Morehouse
km2@cornell.edu

Natural Resources

Martin Hovencamp
mth6@cornell.edu

Nutrition and Health

Elise West
agd2@cornell.edu

Soil Science

Gary Fick
gw2@cornell.edu
Sue Murphy
sm17@cornell.edu

Summary of Basic College Requirements for Graduation

1. Credit Hours
   a. Minimum: 120
   Exception: Credit for tutorial courses (MATH 109, EDUC 005, and 00 level) increase the number of credits required for graduation by the number of credits in the course. The credits do count toward the minimum 12 credits for full-time status.
   b. Minimum at Cornell: 60; maximum transferred in (C- or higher): 60.
   c. Minimum from College of Agriculture and Life Sciences: 55 (includes credit used in the distribution and appropriate transfer credit).
   d. Maximum from endowed colleges (Arts and Sciences; Architecture, Art, and Planning; Engineering; and Hotel School) without additional charge: 55 (includes credit used in the distribution AND failed courses). Summer session courses taken in endowed colleges do not count.
   e. Minimum with letter grade: 100; maximum with S-U grade based on 120 credits: 55 (includes credit used in the distribution and appropriate transfer credit).
   f. Maximum independent study, research, and special study credits: 55 (excludes credit used in the distribution and appropriate transfer credit).
   g. Maximum maximum independent study, research, and special study credits: 55 (includes credit used in the distribution and appropriate transfer credit).
   h. Credit for physical education does not count toward the 120 credits or the minimum 12 credits for full-time status (see #6).

2. Residence
   a. Students are entitled to enroll eight full-time semesters (prorated for transfer students). A full-time semester requires
a minimum of 12 credits per semester (not counting physical education. Tutorial courses (see #1A) are counted).

b. A minimum of seven semesters is expected; graduation in fewer than seven requires a petition. Transfer students are credited with one semester in residence for each 15 credits from another institution.

c. Internal transfer students must be enrolled in CALS for at least two semesters, not including residency in Internal Transfer Division.

d. The final semester before graduation must be in residence at Cornell as a full-time student in good academic standing.

**Exception:** Students with eight or fewer credits remaining for graduation and with circumstances that prevent full-time study may petition for approval to complete remaining credits at another institution or part-time in CALS. A petition must be submitted the semester prior to graduation. Contact CALS Registrar's Office for additional information.

### 3. Grade-Point Average (GPA)

Cumulative GPA 2.00 or above must be maintained. Includes only grades earned at Cornell after matriculation to CALS.

For students matriculated prior to 8/01: Cumulative GPA 1.70 or above must be maintained. Includes only grades earned at Cornell after matriculation to CALS.

### 4. Distribution

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.

Credits received for independent study, field, teaching, research, work experience, and internships cannot be used to fulfill the distribution requirement. Courses judged to be asleep in their discipline, such as Education 005, will not be counted.

In 2002, the CALS Faculty Senate approved a proposal from the CALS Curriculum Committee to combine Groups A (Physical Sciences) and B (Biological Sciences) into one group to provide more flexibility for students to fulfill the physical and life sciences distribution requirement. This policy applies to both new and current students in CALS. Letter designations no longer will be used for the groups described below.

### Physical and Life Sciences

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

| Intro Biology: BLOG 101-104, 105-106, 107-108, or 109-110 |
| Biology Sciences (except BLOG 200 and 499 unless permission of the director of undergraduate biology is obtained): BLOG 209, BLOG 498, and BIOSM 204 |
| CHEM |
| PHYS |
| AN SC 100, 110, 111, 215, 221, 280, 300, 301 |
| AEM 209, 210 (310 if taken before: fall 1997) |
| ALS 115 |
| ASTRO |
| BEE 454, 456, 458, 459 |
| BTRY |
| CSS 190, 260, 311, 312, 314, 315, 317, 366, 415, 455, 473, 483 |
| EAS (except 121, 150) |
| EDUC 115 |
| ENTO 201, 210, 212, 213, 215, 241, 260, 277, 325, 344, 370, 463 |
| FD SC (FOOD) 200 |
| ILRST 210 |
| MATH* |
| NS 115, 222, 262, 300, 331, 332, 341, 347, 361, 431, 441, 452 |
| NTRES 210, 420 (301), 310 (305), 313 (315), 413 (316), 523 (320), 522 (350), 514 (370) |
| PL BR 201, 225, 401, 402, 403, 404 |
| PL PA 201, 241, 309, 401 |

* The college mathematics requirement is described below.

### Social Sciences and Humanities

12 credits (in each of the following two categories):

Social Sciences: 100- through 400-level courses in the following departments (excluding Freshman Seminars):

- AIS 312, 340, 353, 401
- AJS 481
- ANTHR
- ARKEO
- AEM 416
- COMM 116, 120, 410, 418, 420, 422
- ECON (excluding all AEM courses)
- EDUC 271, 317, 378, 411 (311), 451, 471, 571
- GOVT
- HD 250 (cannot receive credit for this course and SOC 251)
- LA-GRP/AIS 261, 260 (300), 263 (363)
- NTRES 351 (314) (401)
- PSYCH (exceeded 111)
- S&TS 324, 354, 359, 391, 400, 401, 403, 406, 407, 427, 442, 467, 483
- SOC (excludes D SOC except D SOC 100, 175, 305, 311, 318, 325, 333, 442)

Humanities: 100- through 400-level courses in the following departments (excluding Freshman Seminars and language courses):

- AS&RC (literature and history)
- AJS
- AAN
- ASIAN (literature and history)
- CLASS (literature and history)
- COM 1
- D SOC 100, 175, 318, 442
- EDUC 473
- ENGL (literature only)

**Written and Oral Expression.** Nine credits, of which at least six must be in written expression, selected from the following:

**Written Expression**

- Freshman Seminars
  - COMM 117, 260, 263, 350, 352, 365
  - CSS 200
  - ENGL 280-281, 288-289, 382-385, 388-390
  - FD SC/NS 230
  - LA 215

**Oral Expression**

- COMM 201, 203

Note: This requirement may be fulfilled by completing 1) 9 credits of written expression or 2) 6 credits of written plus 3 credits of oral expression.

Students scoring 4 or 5 on the English advanced placement exam may be awarded three credits which will be recorded in Written and Oral Expression.

### 5. Math Requirement

Faculty legislation requires minimum competency in mathematics to complete a degree in the College of Agriculture and Life Sciences. As a measure of competency in mathematics, all entering undergraduates, including those with advanced placement or transfer credit in calculus, must take the college math proficiency exam (administered during orientation). The following students are exempt from the CALS Math Placement Exam: 1) internal transfer students who already have passed one math course listed below under Group II, section 1, and 2) entering BEE students (who take the placement exam in the College of Engineering).

The CALS exam score determines the college math graduation requirement, and provides placement information. The exam has two components. Cut-off scores divide students into three groups, each with specific graduation requirements.

#### Mathematics requirements and placement suggestions:

**Group I** Students in this group are considered proficient in math for college graduation requirements. If further math is needed for the major, placement score suggests calculus skill level (e.g., MATH 111, 190, 191).

**Group II** Placement score suggests precalculus skill level, and students in this group must satisfy one of the following:

- Successfully complete an approved mathematics course at Cornell. EDUC 115 is recommended. Other approved courses are any mathematics course (except MATH 100, 103, 109, 171).
b. Successfully complete or have completed an approved calculus course at another college or university with a final grade of B- or better.

c. Receive AP credit for calculus (4 or 5 on MATH AB or BC) or statistics.

Group III Students who score in Group III must successfully complete an approved non-statistics mathematics course at Cornell. Approved math courses are EDUC 005 or EDUC 115 or any mathematics course (except for MATH 105, 109, and 171).

Transfer and AP math credit (up to 6 credits) will be recorded in the Physical and Life Sciences group of the college distribution requirements. Additional transfer credit in math will be recorded as general electives. BIE students typically receive fewer AP credits than other CALS students with the same scores. BIE students also may receive AP credits based on the Engineering Mathematics Placement Exam.

6. Physical Education
a. Pass a required swim test, administered during orientation.

b. Pass two courses with a satisfactory grade (courses do not count toward 120 credits for graduation or the minimum 12 credits for full-time study).

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

d. Transfer students are credited with one course of physical education for each semester previously enrolled full-time (12 or more credits) at another college.

Faculty Advising
a. Each student is assigned to a faculty adviser when admitted to the college. The faculty adviser will help the student plan a program of study of courses appropriate to the major.

b. Course enrollment each semester should be planned in consultation with the faculty adviser. Students pre-enroll for courses by entering through CourseEnroll, under courses, classes, and exams on the Bear Access menu. Pre-enrollment by computer is not valid until the student's individual code is entered. This code, or adviser key, is provided to the student by the faculty adviser after approval of the choice of courses.

c. All academic plans, such as acceleration programs, must be approved by a faculty member in the proposed area of study. Academic achievement is considered in all cases, a student may be referred to trial semester, the student must achieve a predetermined average (usually 2.7) and take certain courses.

d. Students must meet the graduation requirements in fewer semesters. A student who wishes to continue study after graduation must apply for admission as a special student through the college admissions office, 177 Roberts Hall.

c. Application to graduate. In the first semester of their senior year, students must complete and submit an Application to Graduate to the college registrar's office by the end of the eighth week of class. The adviser must first sign the application verifying that the student will be able to satisfy all major requirements. Students with two majors or a minor must obtain signatures for each major and/or minor. Students must meet with the college registrar, who signs the application after verifying that the college requirements will be fulfilled after successful completion of the student's final semester. Note: It is the student's responsibility to meet all graduation requirements. The student must resolve all problems, even if discovered late in the term, before the degree can be awarded.

d. A student's classification is based on the number of credits completed. It does not include the number of "in progress" credits. The classifications are as follows: Freshman = 1-30 credits Sophomore = 31-60 credits Junior = 61-90 credits Senior = 91 and more credits

Credit Earned While in High School
Transfer credit will not be accepted for the successful completion of the student's high school senior and/or minor. Students must meet the graduation requirements in fewer semesters. A student who wishes to continue study after graduation must apply for admission as a special student through the college admissions office, 177 Roberts Hall.

Admission
The CALS Admissions Office selects applicants who are academically well prepared and appear most likely to benefit from the college's various curricula.

While most students come from New York State, about 35 percent come from other parts of the United States or abroad. Slightly more than half of the undergraduates are women. Approximately 22 percent are self-identified as members of minority ethnic groups. The CALS Admissions Office is in 177 Roberts Hall (607-255-2036; web site: www.cals.cornell.edu/admissions/).

Transfer Students

All accepted transfer credit must be from a regionally accredited college/university. Transfer credit is awarded on a case-by-case basis. Additional course information may be required. Contact CALS Registrar's Office for information. A maximum of 60 external credits is allowed.

Approximately 20 percent of CALS undergraduate students are transfers who have completed part of their collegiate work at community colleges, agricultural and technical colleges, or four-year institutions. Many of them hold an associate degree. Detailed information on transfer admission is available from the CALS Admissions Office.

Intra-University Transfer

A Cornell student in good standing may apply for an intra-university transfer to pursue a course of study unavailable in his or her current college. Guidelines are available in the CALS Admissions Office. The procedure involves filing a transfer request, meeting with a faculty member in the proposed area of study, and submitting a letter of interest in the new area.

Each student must be prepared for transfer during their freshman year. In certain cases, a student may be transferred to the Internal Transfer Division (ITD) to study for one semester before entering the college. A second semester in ITD is considered only in unusual circumstances. During this trial semester, the student must achieve a predetermined average (usually 2.7) and take approved courses to assure acceptance.

Special Students

A limited number of non-degree candidates who want to take courses in the college are admitted each year. Applicants should submit the standard Cornell application, a resume of their work experience, and a list of the courses in which they are interested. For more information and guidance on the special student program, contact the CALS Admissions Office.

Off-Campus Students

Programs in which students study off campus but enroll for Cornell credit include SEA Program, field study in human ecology or industrial and labor relations, Albany
programs, Cornell in Washington, student teaching, IPM internship, and clinical microbiology internship. Students intending to receive Cornell credit for work done off campus should inform the college registrar at the time of enrolling for courses to ensure that proper registration will occur.

Off-Campus Courses
Students in CALS must be registered for at least 12 credits of course work each semester. It is expected that students will not be enrolled in course work at another institution while they are enrolled at CALS. Two exceptions to enrollment elsewhere while being a full-time student at Cornell are the joint enrollment agreements between Cornell and Ithaca College and Wells College. Other exceptions must be reviewed by the Committee on Academic Achievement and Petitions. Students must petition before enrolling for a course elsewhere. The committee may approve such petitions only when there are compelling circumstances or no equivalent course available at Cornell. Enrolling in a course at another college to avoid taking it at Cornell is not permitted.

Leave of Absence
A student wishing to take a break from studies in a future semester, or those who find it necessary to leave the university before the end of a semester, should submit a written petition for a leave of absence. Such action is necessary to clear the record for the semester and if not taken may adversely affect the student's subsequent readmission to the university.

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 two ways: unrestricted for students in good academic standing (no restrictions placed on length of leave, or activities pursued), or restricted (length of leave and activities pursued may be specified, and a petition to return must be approved by the Petitions Committee).

A database is maintained by the Counseling and Advising Office to assist participation in pre-registration the semester before a student's return.

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.

Graduation and Diplomas
Graduating seniors must complete the Application to Graduate (see the details in Part C of "Progress toward the Degree"). Diplomas are distributed to those who have completed the degree requirements and have been approved by the college faculty. After the commencement ceremony at Schoellkopf Field in May, graduates return to the Ag Quad to obtain their diplomas. For January and August graduates, diplomas are mailed.

ADVISING AND COUNSELING SERVICES
Faculty members in the College of Agriculture and Life Sciences recognize that students need information and advice to make intelligent decisions while in college. They believe that personal contact is the best way to provide information and advice on both academic and personal matters; they consider advising to be an important and integral part of the undergraduate program. Each student enrolled in the college is assigned to a faculty adviser 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, and offers personal counseling. Academic advising is available for students who are interested in international study, need to file petitions to waive college academic regulations, have disability concerns, are experiencing academic difficulties, 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. Students seek counseling and advising on a variety of issues including academic problems, course problems and college procedures, graduation requirements, personal and family problems, stress management, and time management. Two counselors provide short-term counseling with expertise in college policies and guidelines. Counseling is framed as appropriate to each student's academic circumstances. The staff is available on a walk-in basis, as well as by appointment.

Multicultural and Diversity Programs serves to monitor, support, and influence policy on behalf of all minority students in the College of Agriculture and Life Sciences. This population is defined as encompassing all African American, Latin American, Asian American, and Native American people. In the past academic year, MDP 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 students who meet academic criteria set by the college, the State Programs Office, and the New York State Board of Regents. For further information, please contact Catherine Thompson in 140 Roberts Hall.

Within the university, Multicultural and Diversity Programs is charged with acting as the college liaison with the central Office of Minority Education Affairs, the Learning Strategies Center, and the State Programs Office. Other university connections regarding the college's minority student population include the University Career Center and the Office of Financial Aid. The director and 7 to 10 peer advisers

primarily carry out the duties of Multicultural and Diversity Programs. Together, the staff acts as the major advocacy group as well as an informational and referral center. The director provides support for the Academic Human Diversity and Resources Committee. Its constituency includes students, faculty, and the general public.

Given the college's policy on non-exclusionary programming, Multicultural and Diversity Programs is also responsible for some functions that serve the college's entire population. Presently, that includes general college diversity activities and serving as the Prehealth Program authorization and providing ongoing support at all levels for the Office of Counseling and Advising. 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 350 college alumni who have offered to help students and alumni with their career development in a variety of ways. Job search topics include résumé writing, cover letter writing, and interview skills are presented throughout the library and are available on videotape. An active on-campus recruiting program brings more than 90 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 and the staff in 177 Roberts Hall.

Financial aid is administered through the university office in Day Hall. Endowment funds and annual donations in the college provide supplemental aid for students who are eligible for financial aid. Information about these college grants is available from the Office of Academic Programs in Roberts Hall for students who have their financial aid package established through the university office in Day Hall. Grants are processed through the university's Office of Financial Aid.

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 academic integrity is expected of every student in all academic undertakings: students must in no way misrepresent their work, fraudulently or unfairly advance their academic status, or be a party to another student's failure to maintain academic integrity.

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

1. Students assume responsibility for the content and integrity of their submitted work, such as papers, examinations, or reports.

2. Students are guilty of violating the code if they
   • knowingly represent the work of others as their own
   • use or obtain unauthorized assistance in any academic work
   • give fraudulent assistance to another student
   • fabricate data in support of laboratory or field work
   • forge a signature to certify completion or approval
   • submit the same work for two different courses without advance permission
   • knowingly deprive other students of library resources, laboratory equipment, computer programs, or similar aids
   • in any other manner violate the principle of absolute integrity

3. Faculty members assume responsibility to make clear to students and teaching assistants specific regulations that apply to scholarly work in a discipline.

4. Faculty members fulfill their responsibility to
   • maintain in all class, laboratory, and examination activities an atmosphere conducive to academic integrity and honor
   • make clear the conditions under which examinations are to be given
   • make clear the consequences of violating any aspects of the code
   • provide opportunities for students to discuss the content of courses with each other and help each other to master that content and distinguish those activities from course assignments that are meant to test what students can do independently
   • state explicitly the procedures for use of materials taken from published sources and the methods appropriate to a discipline by which students must cite the source of such materials
   • approve in advance, in consultation with other faculty members, which work submitted by a student and used by a faculty member to determine a grade in a course may be submitted by that student in a different course
   • monitor the work and maintain such records as will support the crucial underpinning of all guidelines: the students' submitted work must be their own and no one else's

Cornell's Code of Academic Integrity spells out how individuals who have allegedly violated the code are to be confronted and, if found to be in violation of those standards, sanctioned. The code provides informal resolution of most perceived violations through a primary hearing between the faculty member, the student involved, and an independent witness. If necessary, a hearing before a hearing board follows.

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

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

ACADEMIC POLICIES AND PROCEDURES

Records
The office of the college registrar maintains a complete academic record for each matriculated student. The registrar and assistant registrars are available to consult with students regarding the assignment of credit toward meeting distribution and elective requirements as listed on the Graduation Summary form. Petitions Procedures

Registration Procedures
All students must register with the university and check in with this college at the beginning of each fall semester. Check-in materials are available in 140 Roberts Hall.

Course Enrollment Procedures
Students will receive course enrollment information from the university registrar. After planning a schedule of courses in consultation with their faculty adviser, students pre-enroll by computer through CourseEnroll in "Just the Facts" located in the Bear Access menu. Pre-enrollment is not valid until the student enters the adviser key code, received from their faculty adviser, into the computer. The adviser key code changes each semester to ensure ongoing contact between student and faculty adviser.

To enroll in courses that involve independent study, teaching, or research, a student must file an independent study form, available in the college Registrar's Office, 140 Roberts Hall. Students who will be off campus should notify the Registrar's Office to ensure that proper registration will occur.

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 GPA. If a student retakes a course in which a passing grade was earned, the second time will be for no credit.

Students must not enroll again for a course in which they received an incomplete or NGR. 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.

Students enrolled in a two-semester course will receive an R at the end of the first semester and should enroll again for the same course the second semester. The letter grade will be recorded for the second semester when all work for the course is completed. A note on the transcript will explain the R grade.

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 on-line 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 adviser is required to change course enrollment. Department or course instructor approval may be required on select courses.

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

Students wishing to withdraw from a course after the end of the seventh week must petition to the college Committee on Academic Achievement and Petitions (also see Petitions Procedures below). Petition forms are available in Counseling and Advising, 140 Roberts Hall. 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.

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 committees, records of students toward meeting graduation requirements
• receives and acts upon 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 upon 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 regulation may be filed by any student who has grounds for exemption. Forms are available in Counseling and Advising, 140 Roberts Hall. Counselors are available to assist with the process.
A petition is usually prepared with the assistance of a student's faculty adviser, whose signature is required. The adviser'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. Petitions for withdrawing from a course are discussed above.

Academic Deficiency Policies

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 2.0*
- cumulative GPA of at least 2.0*
- satisfactory completion of 12 or more credits per semester
- reasonable progress toward completion of distribution requirements
- appropriate completion of college and university requirements

In general terms, regular participation in course work with academic loads at a level sufficient to assure graduation within eight semesters and grades averaging C (2.0) or higher are prima facie evidence of satisfactory progress and good academic standing.

*For those students matriculating 8/01 or later. Requirements are 1.70 for those who matriculated prior to 8/01.

Grade Reports

Grade reports for the fall semester are available on "just the Facts" in January, grade reports for the spring semester are mailed by the Office of the University Registrar to students at their home addresses unless alternative addresses are reported to the university registrar by mid-May.

ACADEMIC HONORS

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

Dean's List. Each semester, students are recognized for academic excellence by inclusion in the Dean's List. Eligibility for the Dean's List in the College of Agriculture and Life Sciences is determined by the following criteria:

1. a minimum course load for the semester of 12 letter-graded credits;
2. achievement of a semester GPA of at least 3.50; and
3. 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.

Bachelor of Science with Honors. Students receiving a cumulative GPA of 4.0 or greater (based on the last four full-time residential semesters of Cornell credits, with a minimum of 48 letter-graded credits) will graduate "summa cum laude."

Students receiving a cumulative GPA of greater than or equal to 3.75 and less than 4.0 (based on the last four full-time residential semesters of Cornell credits, with a minimum of 48 letter-graded credits) will graduate "magna cum laude."

Students receiving a cumulative GPA of greater than or equal to 3.5 and less than 3.75 (based on the last four full-time residential semesters of Cornell credits, with a minimum of 48 letter-graded credits) will graduate "cum laude."

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.

Ho-Nun-De-Kah. Founded in 1929, is the undergraduate honor society of the College of Agriculture and Life Sciences. Members are recruited from the top 20 percent of the senior class and top 15 percent of the junior class. In keeping with the ideals of encouraging scholarship, leadership, and citizenship, members provide free tutoring and a variety of service activities to both the college and the community.

Gamma Sigma Delta is an honor society of faculty members and students in the Colleges of Agriculture and Life Sciences, Human Ecology, and Veterinary Medicine. The common bond is promotion of excellence in work related to the quality of our environment and life as it relates to agriculture and the related sciences. The Cornell chapter recognizes the academic achievements of students, faculty members, and alumni of those colleges with nominations for membership and with special awards. To be eligible, seniors must be in the upper 15 percent of their major. Five juniors with the highest grade point average in the college are also nominated. Gamma Sigma Delta also promotes academic excellence through sponsorship of special programs in the three colleges.

Golden Key is an international honor society that recognizes and encourages scholastic achievement and excellence in all undergraduate fields of study. Juniors and seniors in the top 15 percent of their class are invited to membership. Visit Golden Key's web site at www.nso.cornell.edu/gkhs.

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 of this program requires a thesis written in the style of a master's thesis or a professional journal article in that area of research. Original honors research may be published in a professional journal. Students are required to send an electronic version of their thesis title, abstract, student's name, and the research advisor's name to Ann Gantner, amg28@cornell.edu, by the end of the spring semester. During the summer of each year, the CALS Research Honors Abstracts is published as a compilation of abstracts of the honors theses. 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 is 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.

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

Research may be done under the appropriate program area: Animal Sciences, Biological Sciences, Biology & Society, Entomology, Information Science, Landscape Studies, Natural Resources, Nutritional Sciences, Physical Sciences, Plant Sciences, and Social Sciences. Each program area has its own requirements in addition to the college requirements. After reviewing the requirements of each program area (below), students' questions may be directed toward the appropriate program area chair.

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

College Requirements

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

Interested students must make written application to the CALS Registrar's Office no later than the end of the sixth week of the first semester of their senior year, but are encouraged to make arrangements with a faculty member during the second semester of their junior year (or earlier if required by the program area). Earlier application deadlines to program area committees are noted in the sections below. For most of the program areas, an application form is available from the college registrar in 140 Roberts Hall. The application form also can be printed from the web at www.cals.cornell.edu/oap/registrar/req_hon_main.htm. Applications for Biological Sciences students can be picked up at 200 Stimson Hall, and for Biology & Society students, at 306 Rockefeller Hall.
Before the completed application is returned to the registrar, signatures of approval are required in the following order: faculty research mentor, academic adviser, and the research honors program area chair. After the college registrar verifies the student's GPA, the student will be officially enrolled in the honors program. Additional requirements for application and completion of the program are described under each particular program area.

Academic credit also may be earned by enrolling in an appropriate independent research course (required by some program areas). When applying for admission to the program, the student may, if appropriate, submit a budget and a modest request for funds (up to $350) to cover some of the costs incurred in doing the research. If approved, the funding will be transferred from an account in the CALS Office of Academic Programs to a departmental account of the student's research adviser to support the student's research. This funding is not to be used as a student salary. Additional funding opportunities are described on the Undergraduate Research Opportunities website at www.cals.cornell.edu/oap/admin/undergrad_res_oppor.htm.

Unless otherwise indicated in the following program area descriptions, the research report in the form of a thesis or journal article should be submitted to the research program committee no later than four weeks before the end of classes of the semester in which the student expects to graduate. Students in the College of Agriculture and Life Sciences wishing to participate in the Research Honors Program must be accepted in one of the program areas approved by the faculty. Students 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 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 during any event at Cornell. Some departments have seminar series when presentations may be given. The Cornell Undergraduate Research Board (CURB) Forum is another venue for presentations. For more information, consult the web at www.cals.cornell.edu/oap/registr/res_hon_main.htm.

Animal Sciences
Faculty committee: S. M. Quirk, chair; Y. R. Boisclair, J. R. Giles, P. A. Johnson, R. E. Austin.

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 a high level of careful 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 advisers by their junior year. All students are expected to meet the college requirements in qualifying for the program and to complete the following:

- Identify a potential research honors project sponsor (i.e., a faculty member working in the animal sciences) and secure that faculty member's commitment to sponsor the student in the research project. This should be accomplished by the second semester of the junior year. Students are encouraged to implement some research during the junior year and/or summer before the senior year.
- Register for AS 499, Undergraduate Research.
- Participate in AS 402, Seminar in Animal Sciences, during the spring semester and report on and discuss the project and results (see exceptions under particular program areas).
- 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 area of the student's major.

Prerequisites
- Application forms for the Research Honors Program submitted to 306 Rockefeller Hall.
- April 15: Thesis completed in a form satisfactory for evaluation and submitted to the three readers.
- April 29: Thesis defense accomplished.
- May 13: Two bound copies of completed and defended thesis submitted to director of undergraduate studies.

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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 15: Thesis completed in a form satisfactory for evaluation and submitted to the three readers.
- April 29: Thesis defense accomplished.
- May 13: Two bound copies of completed and defended thesis submitted to director of undergraduate studies.

Entomology
Faculty committee: B. L. Peckarsky, 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 physiological 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.

Prerequisites
An undergraduate wishing to enroll in the Research Honors Program must have completed at least 55 credits, at least 30 of which must be at Cornell. Also, the student must have attained a cumulative GPA of at least 3.0 at the time of entry and maintain this GPA to graduate with distinction in research. The CALS registrar will verify GPAs of applicants before officially enrolling them in the Research Honors Program. Research honors students have the option of earning academic credit by enrolling in Independent Study (ENTOM 497) during any semester while working toward a research honors thesis. Credits and grade option for satisfying requirements of ENTOM 497 should be discussed with the thesis adviser (following page.) Note: Enrolling in independent study is not a requirement for
graduating with distinction in research honors in entomology.

**Sequence of Requirements**

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

- Discuss the matter with his or her academic adviser, 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.
- Select an appropriate faculty member in the Department of Entomology who can serve as a supervisor to oversee the honors research. This need not be the student's academic adviser. The academic adviser will be of assistance in determining which faculty entomologist has expertise most compatible with the interests of the student.
- Prepare a brief, tentative plan for the project for discussion and approval of the honors project supervisor. The plan should include a statement of objectives or hypotheses, proposed methods for testing hypotheses, needs for laboratory space or shared equipment, and a budget outlining financial support needed for travel and supplies.
- Submit a completed application and proposal (approved by the honors project supervisor and the chair of the Entomology Research Honors Committee) no later than the end of the sixth week of the first semester of the senior year. Earlier submission is encouraged. Applications are available and should be submitted to the CALS registrar, 140 Roberts Hall. These applications include an opportunity to request a modest amount of funding from the CALS honors program. These funds are distributed only one time per year (in late fall).
- Submit a brief progress report, approved by the project supervisor, to the Entomology Research Honors Committee by mid-semester in which the student will complete his or her graduation requirements.
- Present a formal seminar reporting the significant findings of the research to the Department of Entomology (as a Juggate seminar) in the last semester of the senior year.
- Submit two copies of the final honors thesis (as approved by the thesis supervisor) to the chair of the Entomology Research Honors Committee no later than two weeks before the last day of classes in the semester in which the student anticipates graduation. The thesis will be reviewed by the faculty honors project supervisor and one other referee selected by the chair of the honors committee.
- Referees will return the thesis to the student one week before the last day of classes. If reviewers indicate that changes must be made, the revised thesis should be submitted to the Entomology Research Honors Committee chair no later than three days before the last day of classes. Referees should include a recommendation to the Entomology Research Honors Committee chair regarding acceptability of the honors thesis. The approved honors theses will be bound and housed in the Entomology Library in Comstock Hall.

**Information Science**

Students should follow the CALS Social Sciences guidelines to obtain research honors in Information Science.

**Landscape Studies**

Faculty committee: K. Gleason, chair

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

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

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

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

**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 499).

- Work with a faculty adviser to identify and formulate a research problem. If the faculty adviser is not in the Department of Landscape Architecture, select a co-adviser from the department to ensure that the research is consistent with the field.
- 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 submission is 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.
- Carry out an independent research effort that is original and separate from the work of others who may be investigating similar subjects.
- Submit an outline of the thesis to the chair of the committee by the end of January for a May graduation.
- Submit a draft to the readers by April 15. Describe and summarize the work within the range of format of the student'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.
- 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.
- 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 under the direct supervision and guidance of a faculty member or senior research associate in the department. Most students in the program begin their research prior to the start of the senior year, often in the summer after their junior year. Students may enroll and receive credit in independent study (NTRES 495) during their honors research. The research findings are presented in a written thesis that is reviewed by two experts in the field. Many theses have been published in leading journals in the disciplinary area of the research. Although the format is not prescribed, the thesis usually consists of a short introduction, relevant
is accepted into a faculty member's research program and 2) submits a research proposal abstract that is approved by the director of the Research Honors Program.

Students interested in the program typically spend the spring sophomore term and fall junior term exploring honors project opportunities with prospective faculty mentors. Students are responsible for contacting faculty members and applying to their research programs, although the guidance in this process will be provided in NS 398. By the fall of the junior year, the student is expected to have identified their faculty mentor and be working with him/her on a proposal abstract, which is due early in the spring junior term.

Students receive academic credit for work on their honors project under NS 499. The six required credits may be taken over several semesters. How much time is spent on the project each term will be the decision of the student and the faculty mentor. For each three to four hours of work per week, the faculty mentor usually will assign one hour of academic credit. This applies to the preparation of the research plan and necessary library research (usually completed during the junior year) as well as the carrying out of the research itself and preparation of the thesis.

The Research Honors Project is the major component of the Research Honors Program. It should be well defined and sufficiently circumscribed to give the student the opportunity to develop the research plan, execute the research, and write an acceptable thesis within the limited time available to students carrying full academic loads. Typically, the project is designed early in the junior year and conducted in the spring junior term and fall senior term. Students may arrange with their faculty mentor to work on the project during the summer. The spring senior term is usually devoted to writing the thesis (at least 25 pages). The student works with the faculty mentor to prepare a draft of the thesis, which is submitted before spring break to a second faculty member for evaluation. When the 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 term.

**Physical Sciences**
Faculty committee: A. T. DeGaetano, chair

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:

- Identify a thesis adviser and thesis topic before the end of junior year.
- Work with the thesis adviser, prepare a budget and application form (due by the sixth week of senior year).
- Enroll in the program for a minimum of two semesters.
- Enroll in the appropriate departmental undergraduate research course for a total of at least six credits.
- Submit an outline of the thesis to the chair of the committee by the end of January (for a May graduation).
- Submit a draft of the thesis to the thesis adviser with sufficient lead-time for a revision to be prepared.
- Submit three copies of the thesis and names of recommended reviewers to the chair of the honors committee by three 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.

**Plant Sciences**
Faculty committee: R. L. Ohendoff, chair; I. A. Merwin, E. B. Nelson, F. S. Rossi

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

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

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

Research projects in this program area include Applied Economics and Management, Communication, Development Sociology, Education Policy, and International Studies. Students are accepted into the Social Sciences Research Honors Program of the College of Agriculture and Life Sciences after meeting all the college criteria described above, after evaluation of the student's written proposal, 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 adviser 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 his or her faculty adviser. 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:

- **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.

- **Research Questions/Empirical Hypotheses:** Specify the proposed questions or hypotheses to be tested empirically via collection of data and a mode of analysis accepted in the social sciences.

- **Research Methods:** Discuss the models to be constructed (if any), sampling procedures, data collection procedures (including instruments and survey or experimental designs, if appropriate), and proposed methods of analysis.

- **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 advisers must be members of the graduate faculty. Exceptions may be granted for persons with special expertise who are deemed capable of thesis supervision; exceptions may be granted pending petition to the Social Science Honors Committee. Students must register for honors credit directed by the faculty research honors project adviser.

Distinction in research is awarded upon approval of the research honors thesis by the Social Science Research Honors Committee. The research should deal with a substantive issue in one of the fields in the social sciences. 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 to count as research.

Honors theses should be written according to the form of any standard journal within the appropriate field. The recommender submits a copy of the thesis draft to the student's research advisor by the beginning of the month two months prior to graduation, for revision suggestions. Two copies of the thesis must be submitted to the chair of the social science committee no later than the middle of the second-to-last month prior to 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.

**INTERCOLLEGE 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 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 adviser as part of their undergraduate program. These courses count toward the endowed college credits (maximum 15 without additional tuition charge). Students may consult with the college registrar, 140 Roberts Hall, to verify degree requirements and endowed credits earned.

Students in the Engineering Program in Biological and Environmental Engineering (BEE) are usually enrolled in the College of Agriculture and Life Sciences during the freshman and sophomore years and jointly enrolled in this college and the College of Engineering in the junior and senior years. All BEE engineering students pay the engineering college tuition differential and graduate from the College of Engineering. The B.S. degree is awarded in cooperation with the College of Engineering. The program is accredited by the Accreditation Board for Engineering and Technology.

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

The Division of Nutritional Sciences is an intercollege unit affiliated with the College of Human Ecology and the College of Agriculture and Life Sciences, food, and agriculture major offers students in the College of Agriculture and Life Sciences the opportunity to focus their studies in human nutrition while obtaining a strong background in courses related to agriculture and the life sciences. Students in the biological sciences major may complete the program of study in human nutrition. Courses offered by the Division of Nutritional Sciences support many undergraduate programs in the College of Agriculture and Life Sciences including animal sciences, biological sciences, communication, food science, international agriculture, plant sciences, and rural sociology.

Nutritional science courses count toward the undergraduate degree requirement for 55 credit hours of courses in agriculture and life sciences.

The American Indian Program (AIP) is a multidisciplinary program consisting of academic, research, extension, and student support components. Course work is intended to enhance students' understanding of the unique heritage of North American Indians and their relationship to other peoples in the United States and Canada. Students tackle such challenging topics as the sovereign rights of Indian nations and the contemporary relevance of Indian culture to the environment. The program's instructional core consists of courses that focus on American Indian life from pre-contact times to the present, and feature the perspectives of Native American people.

Research among faculty active in the program include American Indian education, social and economic development, agriculture, environmental issues, anthropology, history, sociology, language, literature, law, and the arts and cultural preservation. Extension and outreach efforts within the program seek to develop solutions to problems identified by American Indian communities and to facilitate the application of institutional resources, research, and expertise to community needs. Akwe:kon, the American Indian Residence House, offers undergraduate students a living environment that promotes intercultural exchange.

The American Indian Program offers a concentration in American Studies to undergraduate students in conjunction with their major defined elsewhere in the university. The concentration is earned upon completion of five courses: AIS 100, Indian American Studies; AIS 101, Contemporary American Indian Issues; plus three other courses selected from the AIS course listing, for a total of at least 15 credits. Students choosing a concentration in American Indian Studies must obtain application materials from the AIP office in 450 Caldwell. AIP also offers a graduate minor.

Science and Earth Systems (SES) The SES major emphasizes the basic study of the Earth system. Under the increasing pressure of public concerns about air and water pollution, nuclear-waste disposal, the ozone hole, and global warming, the scientific community has realized the importance of the connections among the Earth's spheres that are usually studied as separate parts of the Earth system. While the major components—the biosphere, hydrosphere, atmosphere, and lithosphere—are studied in detail within the boundaries of traditional disciplines, the components interact is key to understanding how our home planet works, its past history, and its likely future.
The Science of Earth Systems (SES) major at Cornell offers an interdisciplinary approach to understanding and managing the Earth. The major is a collaborative effort among faculty members from the following departments: Earth and Atmospheric Sciences, Astronomy, Natural Resources, Ecology and Evolutionary Biology, Biological and Environmental Engineering, and the School of Civil and Environmental Engineering.

The major offers several concentrations, including biogeochemistry, ocean sciences, ecological systems, environmental geology, hydrologic and climate dynamics, planetary sciences, and soil science. All concentrations require students to take at least two courses in calculus, physics, chemistry, and biology, as well as three additional courses in basic science and math, three courses emphasizing the interconnectedness of the Earth system (Climate Dynamics, Evolution of the Earth System, Biogeochemistry), and four courses in one of the areas of concentration. Recommended courses for the major are the following:

- Hydrological systems, climate dynamics, ecological systems, environmental geology, of the Earth System, Biogeochemistry,
- Two courses in calculus, physics, chemistry, planetary sciences, and soil science. All
- The major provides an excellent background for students wishing to pursue careers in environmental law, policy, and consulting. SES is also a good major for students wishing to teach earth and environmental science at the high school level.

See the Science of Earth Systems listing in the section “Major Fields of Study” or visit www.geo.cornell.edu/ses/SES_home.html for more detailed directions of the major. For more information, contact Professor Stephen Colucci, Department of Earth and Atmospheric Sciences, sjc25@cornell.edu.

The Comparative and Environmental Toxicology Program is an interdisciplinary intercollege program with research, teaching, and Cooperative Extension components coordinated by the Institute for Comparative and Environmental Toxicology (ICET). Courses are cosponsored by academic departments in several colleges of the university. A description of the program and general information is available from the director of the program through the ICET office, 213 Rice Hall, or on the web at inters.earth.cornell.edu/ research/ctoxtoto. See also the Interdisciplinary Centers, Programs, and Studies section at the front of this catalog.

The Cornell Institute for Resource Information Systems (Cornell IRIS) is an interdisciplinary, intercollege unit affiliated with the Department of Crop and Soil Sciences. The mission of Cornell IRIS is to advance the development and use of spectral and spatial information science and technology to benefit the environment. The institute comprises three program areas: environmental resource inventory, remote sensing, and geographic information systems. A description of these programs and general information is available from the institute director, Cornell IRIS office, 302 Rice Hall.

OFF-CAMPUS STUDY PROGRAMS

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

Students who plan to enroll in courses at another institution in the United States must petition for a leave of absence. Courses should be selected in consultation with the faculty adviser.

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 spring prior to assignments. Those accepted should plan a program of study in consultation with their faculty adviser. At least 12 credits must be carried to meet the residency requirement. To receive academic credit for the internship, students enroll in ALS 400 for an S-U grade only.

Information and applications are available in the CALS Career Development Office, 177 Roberts Hall.

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. Students participate in a public policy forum that includes externs as well as in federal agencies, congressional offices, or on environmental organizations, and carry out individual research projects under the supervision of Cornell faculty members. 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 500 and cannot receive credit for the externship experience alone. For further information, see p. 21, inquire at M101 McGraw Hall, 255-4090, or visit the Cornell in Washington web site at ciw.cornell.edu.

SEA Semester

The Sea Education Association is a nonprofit educational institution offering ocean-focused academic programs and the opportunity to live, work, and study at sea. Science, the humanities, and practical seamanship are integrated in small, personalized 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 SV Robert Seamans or the SV Cornell Cramer. For more information, students should contact the Cornell Marine Programs office, G14 Stimson Hall (607-255-3717) or visit SEA’s web site: 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, New Hampshire. SML offers undergraduates and other interested adults a unique opportunity to combine marine science in a setting noted for its biota, geology, and history. Please refer to “Courses in Marine Science,” under the section on the Office of Undergraduate Biology, for a list of courses offered.

For more information, contact the Shoals Marine Laboratory office, G14 Stimson Hall, 607-255-3717 or visit their web site: www.sml.cornell.edu.

Internships

Several departments in the college offer supervised internships for academic credit. Internships may be granted for paid and/or credit with a limit of up to three credits per internship and no more than six credits total allowed for internships consisting of off-campus work experiences that do not have the continued presence of a Cornell faculty member. The number of credits awarded should reflect the amount of knowledge gained per internship and/or following the CALS guidelines for assigning credits. The internship should be purposeful, work oriented and approved by the student’s faculty adviser. Before a student begins the internship, the student should bring to the college or to a professor a description of a past experience and requests credit. Note that a maximum of 15 credits is required (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 Agricultural and Life Sciences has set forth guidelines to serve as minimum requirements for a student to receive internship credit.

- Credit will only be assigned or accepted in cases where a Cornell faculty member is directly involved in determining both the course content and in evaluating the student’s work.
- 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.
- Before a student begins the internship, a learning contract needs to be written between the student, the 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.

• Students should further develop the internship experience based on the college Experiential Learning Criteria, which can be obtained from the Registrar's Office in 140 Roberts Hall.

• Students need to keep their faculty internship adviser 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.

Undergraduate Research

A multitude of opportunities to be engaged in research exists across the College of Agriculture and Life Sciences and the university. You 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 499-level course within a department by conducting your own research project under a faculty mentor. More than 600 students each year conduct research for credit. Upperclass students usually have the course background to engage in research, but freshmen and sophomores also may be equipped to do some types of research. Off-campus research experiences are also available for pay or as internships.

The following web sites provide information about research and internships.

CALS Career Development Office:
www.cals.cornell.edu/oap/careers/

CALS Undergraduate Research Opportunities:
www.cals.cornell.edu/oap/admin/undergrad_res Oppor.htm (information about how to explore research opportunities.)

CALS Research Honors Program:
www.cals.cornell.edu/oap/Registrar/Res_hon_main.htm

CALS Undergraduate and Graduate Research Funding:
www.cals.cornell.edu/oap/admin/undergrad_grad_grants.htm

CALS Undergraduate Underrepresented Minority Research Funding:
www.cals.cornell.edu/oap/admin/minority_research.htm

CALS Internship Guidelines:
www.cals.cornell.edu/oap/admin/intern_guide.htm

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

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

Biological Sciences:
www.bio.cornell.edu

Study Abroad

Each year close to 200 CALS undergraduates spend a semester or year studying abroad. Students study at a university in Australia, participate in fieldwork in Africa, or explore the wonders of the ocean while learning to sail a tall ship on the Sea Semester program. CALS students have many opportunities available to them. They can:

• participate in a college one-to-one exchange program in Australia, Brazil, Denmark, Mexico, New Zealand, Singapore, Sweden, Switzerland, Turkey, or the United Kingdom;

• apply for a study-abroad program through the Cornell Abroad office;

• participate in a study tour as part of a CALS course, or take part in a summer program designed especially for CALS students.

CALS exchange programs are exciting opportunities created specifically for CALS students. Students participating in a college-exchange program pay only their Cornell tuition, with no additional administrative fees. To learn more about the exchange programs and other college opportunities, please visit www.cals.cornell.edu/oap/advising/international/index.html.

The opportunities offered through the Cornell Abroad office are vast, and can be traditional classroom study or conducting research in the rainforests of Costa Rica. Students wanting to participate in these study-abroad programs apply through the Cornell Abroad office. The application requirements and program costs vary based on the program. Check the Cornell Abroad web site (www.cuabroad.cornell.edu) for information about the application process, specific program and cost information, and visit their office in 300 Caldwell Hall.

All CALS students interested in studying abroad, whether on a CALS exchange or through Cornell Abroad, must have the approval of their faculty adviser and meet with the college Study Abroad Adviser to review the college policies and to receive college approval. College policies can be viewed at www.cals.cornell.edu/oap/advising/international/policies.html.

Study-abroad walk-in hours are held in 140 Roberts Hall on Tuesdays and Thursdays, 9:00 A.M.–noon and Wednesdays 1:00–3:00 P.M.

MAJOR FIELDS OF STUDY

The college curriculum consists of 22 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 majoring in the area. 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 major area are different, but all students must meet the minimum distribution requirements of the college.

Animal Sciences

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

The program focuses on the application of science to the efficient production of animals for food, fiber, and pleasure and easily accommodates a variety of interests and goals. Beyond a core of basic courses (suggested minimum, 15 credits) students select production and advanced courses to fulfill an individually tailored program worked out in consultation with their advisers. 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 farm or enter a related career. Other students may elect a program oriented toward economics and business in preparation for a career in the poultry industry, animal, horse, feed, or meats industry. These are examples of the flexibility within these programs that can be developed to meet a student's career interest related to animals.

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

Students declaring a minor in animal science will arrange for a formal academic adviser 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 six of which must be taken at Cornell), the makeup of which will be determined in consultation with the adviser. For example, it is recommended that students...
completing the minor will assemble courses (or demonstrate having the equivalent from elsewhere) including some basic and applied biology of animals (anatomy, physiology, nutrition, genetics) along with a selection of intermediate or advanced offerings from the animal science curriculum. Satisfactory completion of minor requirements will be verified by the minor adviser’s signature on the Petition to Graduate.

For information, contact Deloris Bevins in 149 Morrison, db11@cornell.edu.

Applied Economics and Management

The Department of Applied Economics and Management (AEM) offers undergraduate programs of study in three broad areas: Business, agribusiness, and Applied Economics.

AEM is home to Cornell’s undergraduate general business degree. Here students can immerse themselves in finance, marketing, management, and business strategy courses, as well as take specialized courses in entrepreneurship, food industry management, and agribusiness. This highly selective program is accredited by AACSB International, the accrediting body for general business degree programs.

AEM also includes undergraduate specializations that focus on the economics of agriculture and the environment. All AEM courses stress the application of analytical skills, critical thinking, and economic theory to real-world business and public-policy issues.

The six areas of specialization offered in AEM are:

Business, one of the largest undergraduate majors at Cornell University, offers students a broad array of courses in the fields of finance, marketing, management, accounting, and entrepreneurship.

Food industry management is a specialized business program for students interested in management positions in the retailing, manufacturing, and distribution sectors of the food industry.

Agribusiness management students study general business and take courses tailored to agricultural businesses.

Farm business management and finance is for students interested in working for firms with ties to farming and agriculture, such as cooperatives, banks, horticultural businesses, and family farms.

Agricultural and applied economics is a broad-based specialization that focuses on such important national and international issues as the economics of policy, markets, production, international trade, and international development.

Environmental and resource economics students study the economics of water and air quality, waste management, rural-urban land use, the sustainability of natural resources, energy use, and global climate change. AEM graduates are actively recruited by elite businesses for positions in finance, marketing, investment banking, and management consulting, as well as by federal and international agencies. Many graduates go on for advanced professional and academic degrees, often after several years in a challenging career position in business or government.

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. Mathematics, Computer Science, and Statistics:
   a. MATH 111, 112, 213, or equivalent
   b. EAS 121/150 or equivalent
   c. AEM 210 or equivalent
   d. MATH 293 or MATH 294 or EAS 435

2. Basic Physical Sciences:
   a. PHYS 207, 208, or equivalent
   b. CHEM 206 or 211

3. Atmospheric Science:
   a. EAS 131, 250, 341, 342, 352, 447, 451
   b. At least two atmospheric science electives

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

Students interested in becoming secondary-school earth science teachers should complete a minor in education and take introductory courses in geology and astronomy.

Students interested in careers in private sector or commercial meteorology should take business courses such as marketing, management principles, management-information systems, and organizational behavior.

A student may minor in atmospheric science by completing any four of the following EAS courses: 131, 250, 268, 351, 354, 341, 342, 352, 455, 465, 451, 466, 457, 470, 651, 652 or 660.

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

Biological Sciences

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

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

The biology major is designed to enable students to acquire the foundations in physical and life sciences necessary to understand modern biology and to pursue advanced studies in a specific area of biology. Programs of study include either general biology or one of the following concentrations: animal physiology, biochemistry, computational biology, ecology and evolutionary biology, genetics and development, insect biology, molecular and cell biology, microbiology, neurobiology. The undergraduate engineering major in Biological and Environmental Engineering has a unique focus on biological systems, including 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, which is awarded jointly by the Colleges of Engineering and Agriculture and Life Sciences, and is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology, Inc. (ABET). All students in the joint administered BEE major enroll in the College of Engineering and pay endowed tuition their last two semesters.

Biological Engineering students take courses in mathematics, statistics, computing, physics, chemistry, basic and advanced biology, fundamental engineering sciences (mechanics, thermodynamics, fluid mechanics, and transport processes), engineering applications, and 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 further strengthen their programs by completing minors in a second engineering major. Students planning 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 all Biological Engineering students complete a capstone design project. Students in the engineering program may pursue minors and options in specialized areas as noted in the engineering section of this publication. Biological Engineering majors interested in the environment may complete a formal program of courses in the Environmental Engineering Option. Specific course requirements and other information for the Biological Engineering program and the Environmental Engineering Option 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 on the web at www.bee.cornell.edu. The department also offers two technology programs: Biological Engineering Technology and Environmental Engineering Technology. The technology programs emphasize applied and technical aspects of biological, environmental, physical, and life sciences. These programs incorporate courses in basic biological and physical sciences and mathematics as well as engineering and technology, agriculture, business, social sciences, and liberal studies. Many engineering and technology undergraduate students participate in honors programs, undergraduate teaching and research, internships, and senior design teams, and study abroad. Students in the engineering program are also eligible to participate in the Engineering Cooperative Education Program. Students pursuing majors offered in the BEE department 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 for engineers and technologists 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. In recent years graduates have pursued careers in environmental consulting, biotechnology, pharmaceutical industries, biomedical engineering, management, sustainable technologies, consulting, 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 and technical people who have studied biology and the environment, 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 educating the next generation of engineers to meet these challenges. Specific course requirements for the accredited engineering programs are found in the College of Engineering section of this book.

Specific course distribution requirements for the academic programs in Biological Engineering Technology and Environmental Engineering Technology include

**A. Basic Subjects**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
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<tbody>
<tr>
<td>1. Calculus</td>
<td>8</td>
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<tr>
<td>2. Chemistry</td>
<td>7</td>
</tr>
<tr>
<td>3. Physics</td>
<td>8</td>
</tr>
<tr>
<td>4. Introductory biological sciences</td>
<td>6</td>
</tr>
<tr>
<td>5. Computer programming</td>
<td>4</td>
</tr>
<tr>
<td>6. Statistics or probability</td>
<td>3</td>
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<tr>
<td>7. Written and oral expression</td>
<td>9</td>
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</tbody>
</table>

**B. Advanced and Applied Subjects**

1. Five courses in the biological, environmental, or life sciences
2. Five engineering or technology courses at the 300 level or above; including at least 9 credits in Biological and Environmental Engineering

**C. Electives**

Additional courses to complete College of Agriculture and Life Sciences requirements

**D. Total (minimum)** 120

For further details on the Biological and Environmental Engineering and Technology Programs, see the BEE Undergraduate Program Handbook, available at 207 Riley-Robb Hall or on the web at www.bee.cornell.edu. Contact Professor Jim Bartosh at 255-2800, jab35@cornell.edu, or visit the department’s web site for more information.

**Biology & Society**

The Biology & Society program area is designed for students who wish to combine the study of biology with perspectives from the social sciences and humanities. Many of the most critical social issues of our time, from the implications of genetic engineering to the impact of global climate change, have biological processes at their core. At the same time these issues are inherently social, involving complex relationships among people, institutions, laws, and beliefs. The Biology & Society field of study provides the skills and perspectives necessary to confront problems with biological, social, and ethical dimensions. In consultation with a faculty member, students are expected to select courses in the field to meet their own goals and interests. For a description of the Biology & Society requirements and courses, see the section on Biology & Society under the College of Arts and Sciences in this publication or visit the web site 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:

- A one- to two-page statement explaining your intellectual interests in Biology & Society and why it is consistent with your academic goals and interests.
- A selected theme.
- A tentative plan of courses fulfilling Biology & Society requirements, including courses you have taken and those you plan to take.
- A transcript of work taken at Cornell University, 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 adviser is assigned on admittance to the field. Approximately 60 faculty members from four colleges serve as advisers 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 and student advisers are available to discuss the Biology & Society requirements with you.

**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 on the web at www.sts.cornell.edu. Also refer to the section on Biology & Society under the College of Arts and Sciences in this publication.

**Biology & Society Requirements:**

- College calculus (one course)
- Ethics (one course)
- Two social sciences/humanities foundation courses
- Three biology foundation courses
- One biology depth course
- Statistics (one course)
- Core course
- 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 by logging onto the departmental web site: www.sts.cornell.edu.
Biometry and Statistics

The Biometry and Statistics major in the Department of Biological Statistics and Computational Biology focuses on the application of mathematical and statistical techniques to the life sciences. Statistics is concerned with quantitative aspects of scientific investigation: design, measurement, summarization of data, and drawing conclusions based on probability statements. The work of an applied statistician or mathematician can encompass research, teaching, consulting, and computing in almost any combination and in a wide variety of applications. Opportunities for employment are abundant in universities, government, and businesses ranging from large corporations to small consulting firms; salaries are usually excellent.

While satisfying course requirements for the major, students can also take a wide variety of courses in other disciplines. In fact, students are encouraged to take courses in applied disciplines such as agriculture, biology, business, computer science, economics, and the social sciences that involve numerical data and their interpretation.

Students majoring in this area are required to take a computer science course (e.g., COM $100$), mathematics courses (at least three semesters of calculus), BTRY 301–302 or 601–602, and 408–409, as well as a number of electives. Experience gained through summer employment or work as an undergraduate research assistant is highly recommended. Students should contact Professor Steven J. Schwager for information.

Communication

Communication majors at Cornell study communication in three main areas: science, media, and technology. They 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, and learn how communication systems work in society and in their personal and professional lives. How to apply their understanding of communication to solving problems, sustaining the environment, reaching the public with new knowledge, and managing the intricate networks of technologies at our fingertips.

Communication majors learn:

• How communication influences attitudes, opinions, and behaviors.
• How mass media work in our society.
• How to use, evaluate, and design communication technologies.
• How to apply their understanding of communication to solving problems in science, the environment, government, industry, health, and education.

Communication is a program with a strong core of contemporary communication knowledge, theory, and practice. Required freshman courses are:

Fall semester:

COMM 120 Contemporary Mass Communication

Spring semester:

COMM 116 Communication in Social Relationships

COMM 117 Writing about Communication

This set of courses provides students with a basic understanding of communication and the communication process.

During the sophomore year, students take:

Fall semester:

COMM 201 Oral Communication

COMM 282 Communication Industry Research

Spring semester:

COMM 230 Visual Communication

After completing the courses in the core curriculum, all majors take an additional 18 credits in communication. Students can choose to concentrate in one of four predefined focus areas—consultation with adviser—or may plan an independent focus area that is appropriate to specific educational and career goals.

• Communication in the Life Sciences (CILS)—Students focusing in CILS will understand the nature of life, health, and environmental communication, learn specific skills for communicating in the life sciences, and explore conceptual and theoretical issues in science communication.

• Communication Media Studies (CMS)—Students focusing in CMS will analyze and understand the social processes that are affected by media in contemporary society.

• Communication and Information Technology (CIT)—Students focusing in CIT will explore the nature of communication systems and technologies, their social and organizational uses and impacts, and their social design.

• Communication Planning and Evaluation (CPE)—Students focusing in CPE will develop skills in identifying audiences and in preparing and implementing communication programs to meet the needs of those particular audiences.

Courses in this focus area stress the positive, ethical, and effective uses of communication in human affairs.

• Independent Concentration—The Undergraduate Program Committee will review proposed independent focus areas and authorize students to proceed with approved independent concentrations.

Detailed information on the distribution of courses is available from the department.

In designing the communication major, the faculty of the department has kept in mind the need for students 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 116, 120, 201, 230), one advanced communication course (chosen from COMM 203, 260, 263, 301, 350, 352), and two elective courses totaling six credit hours at the 300–400 level, excluding COMM 456 and 498.

The minor program of study in information science is a cross-disciplinary program requiring one prerequisite statistics course, two courses from the information systems component area (primarily computer science), two courses from the human-centered systems component area (human-computer interaction and cognitive science), one course from the social systems component area (social, economic, political, and legal issues), and one additional course from any component area.

A list of specific courses is available through the Department of Communication.

Students should contact the Department of Communication to enroll in either of these programs of study.

Crop and Soil Sciences

The Department of Crop and Soil Sciences provides instruction in three specializations: agronomy, crop science, and soil science. Employment opportunities are increased with practical experience, and the faculty of the department and the Career Development Office of the college are glad to help students search for relevant summer jobs and internship opportunities. Professional certification can also be obtained in these specializations.

Agronomy combines the study of crop production and soil management. It provides the student with a broad array of career opportunities after completion of the B.S. degree, including agricultural business, extension service work, and farming. Graduate school is also possible after a well-planned program. Students should take at least 12 credits of crops and 12 credits of soils and design the remainder of their curriculum to meet specific interests and goals. Some students pursue a major in agronomy with a concentration in international agriculture. Agronomy is also offered as a specialization within the plant sciences major field of study.

Crop science is the application of basic biological and ecological science to the improvement and management of the world's main field crops used for human food and livestock feed. Courses required include 18 credits of crops, 12 credits of plant biology, and 6 credits of soils. Students who anticipate a career in agricultural production or service after completion of the B.S. degree should take additional courses in economics, communication, plant pathology, entomology, and nutrition. Students planning graduate or professional study beyond the bachelor's degree should take advanced course work in organic chemistry and biochemistry, calculus, physics, and statistics. Crop science is also offered as a specialization within the plant sciences major field of study.

Soil science is a basic discipline important in ecology, engineering, agriculture, and conservation. The curriculum in soil science combines physical and biological training to address critical issues in environmental and agriculture management related to soils. Students take 18 credits in soil science, including four credits in the introductory...
course. In addition, chemistry, mathematics, physics, and microbiology are required, as well as six credits of crop science to satisfy the major. Soil science is also offered as a specialization within the Science of Earth Systems major and will become a specialization in the Science of Natural and Environmental Science major.

**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, 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. Courses offered by the department cover topics such as: the impact of changes in agricultural systems on rural development; community and regional development; environmental sociology; rural livelihoods; labor markets; technology and social change; the implications of the genomic revolution for agriculture and communities; the linkages between population dynamics, the environment, and development; the economic and political economy of globalization; women in development; and ethnic competition and stratification. Most courses provide background in both domestic and international aspects of the subject matter. Students can specialize with a domestic, international, or global emphasis by choosing appropriate elective courses. All students learn the theory and methodology of sociology and how to apply both to research and policy in their subject areas.

Majors in Development Sociology are required to successfully complete seven core courses: introductory sociology (D SOC 101), international development (D SOC 205), population dynamics (D SOC 201), methods (D SOC 213 or D SOC 214), theory, (D SOC 301), social stratification (D SOC 370), 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 300 level or higher. The elective courses allow students to focus their major on particular themes such as the sociology of development, the social processes linking the environment, population, and development; and more general areas such as ethnic and class stratification, social movements, social policy, and gender and development. In each of these focus areas, students can choose to concentrate on domestic or international situations. Students are encouraged to work with one or more 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**

Building on strong academic disciplines and grounding in sociopolitical, psychological, empirical, and theoretical bases of educational practice, the program has two foci to meet societal demands for teachers of mathematics, science, and agriculture, and for leaders in nonformal educational settings. Learning, Teaching, and Social Policy (LTSP), which includes the Cornell Teacher Education Program and Adult and Extension Education (AEE). These two programs of study, largely at the graduate level, prepare leaders who will both engage in professional practice and improve educational processes through research, practice, and scholarship. Our undergraduate program leads to provisional certification in agricultural education. The latest information on program developments may be found on our web site, http://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 Adult and Extension Education (AEE) program provides opportunities for graduate students to investigate participatory educational and organizing practices that link learning to the global challenge of facilitating sustainability. As public universities focus on their research, teaching, and extension on critical domestic and global environmental, political, and social problems, AEE graduate students conduct reflective analyses of their own and others' educational and organizing work to ask "who benefits from such efforts in what ways?" Graduate students are expected to develop interdisciplinary perspectives and professional roles that involve them in study that investigate practical, political, social, and ethical issues through empirical and theoretical inquiries of adult and extension education.

The program prepares scholars and practitioners for adult and extension educational leadership and professional roles in domestic and international community-based, nongovernmental, and governmental organizational settings. Areas of inquiry include participatory practices in research, community development, educational evaluation; international adult and extension education programs: domestic extension and community organizing; learning in adulthood; professional and staff development; and health issues related to the education of adults.

**Learning, Teaching, and Social Policy (LTSP)**: This program is designed to foster the development of educational leaders, researchers, and practitioners who approach issues and challenges in education from multiple perspectives, and seek to construct an integrated knowledge base upon which the practice of teaching, learning, and social policy is based. The impacts of implementation and practice are explored for creating new theories, approaches, and policies to improve teaching, learning, and community life.

Drawing on the dynamic nature of teaching and learning, this program challenges students to create and apply research-based, critically reflective analysis of cognitive, intellectual, personal, social, moral, and institutional dimensions of learning. 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. The program prepares scholars and practitioners for adult and extension educational leadership and professional roles in domestic and international community-based, nongovernmental, and governmental organizational settings. Areas of inquiry include participatory practices in research, community development, educational evaluation; international adult and extension education programs; domestic extension and community organizing; learning in adulthood; professional and 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 agriculture, science, and...
mathematics. Students in the CTE program each other. Each of the certification areas education, and interact with and learn from understanding contemporary agriculture requires knowledge of how principles are and is developing. Understanding science fully the changes in the way agriculture is practiced offers a series of courses, both credit and and graduate students who are either currently and graduate students who have, or will have, classroom dynamics, language, and teaching practice. the entomology curriculum provides students environmental 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 a common core of requirements allowing flexibility in electives selected by students in consultation with their advisors. Specific requirements Basic Sciences One year of college mathematics, including a course in calculus; may substitute statistics and biometry One semester of physics CHEM 206–208 or 207–208 (General Chemistry) CHEM 257 (Organic and Biological Chemistry) General Biology Introductory Biology BIOG 241 (Genetics) or Plant Breeding 225 (Plant Genetics) BIOEE 278 (Evolutionary Biology) A choice of one: BIOEE 261 (Ecology and the Environment) or BIOBM 350 or 351 (Principles of Biochemistry) Entomology ENTEM 212 (Insect Biology) A choice of two: ENTEM 322 (Insect Morphology) ENTEM 331 (Insect Systematics) ENTEM 483 (Insect Physiology) Students must also enroll in at least two additional entomology courses offered at the 300–400 level on more specialized topics. 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) Enology. The first option meets the curriculum standards set by the Institute of Food Technologists (IFT), the premier professional society for food scientists, allowing students to compete for IFT scholarships and awards. Students choose an option based on their individual interests and career goals. The first two years of the undergraduate Food Science Program are intended to establish a solid background in the physical and biological sciences, math and statistics, and communication skills. Required courses include chemistry (intro and organic), biology, microbiology, calculus, physics, freshman seminar, introductory food science courses, and nutrition. The last two years emphasize the application of these basic sciences and technology to the manufacturing, processing, quality evaluation, storage, distribution, and safety of foods and food ingredients. Examples of food science core courses include Food Engineering Principles, Physical Principles of Food Manufacturing, Food Safety Assurance, Food Chemistry, Sensory Evaluation of Foods, and Food Microbiology, with many elective courses offered as well. Students choose electives to both satisfy 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 offer interns 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 (E/V) 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 Food Science with a concentration in enology. Students with primary interest in enology and secondary interest in viticulture (E/V) can "major" in Food Science Program (with a concentration in enology) and a "minor" in Plant Sciences (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-sciences 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 eleven 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 (eleven courses):**

1. Introductory (one course):
   - INFO 130 Introductory Design and Programming for the Web

2. Math and Statistics (four courses):
   - MATH 111 Calculus I
     - one course chosen from MATH 171 Statistical Theory and Application in the Real World; AEM 210 Introductory Statistics; BTRY 301 Statistical Methods I; and PAM 210 Introduction to Statistics
   - either MATH 231 Linear Algebra or MATH 221 Linear Algebra and Differential Equations
   - INFO 295 Mathematical Models for Information Science

3. Human-Centered Systems (two courses):
   - INFO 214 Cognitive Psychology
   - INFO 245 Psychology of Social Computing

4. Information Systems (two courses):
   - COM S 211 Computers and Programming
   - INFO 230 Intermediate Design and Programming for the Web

5. Social Systems (two courses):
   - either ECON 301 Microeconomics or ECON 313 Intermediate Microeconomic Theory
   - either INFO 292 Inventing an Information Society or INFO 355 Computers: From Babbage to Gates

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. The Human-centered Systems and Information Systems tracks can be used as primary or secondary tracks. The Social Systems track can be used only as a secondary track.

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 GIS section of Courses of Study. Course information for all other courses in the major can be found in the relevant departments (e.g., AEM, COM S, and S&TS).

1. **Human-centered Systems**
   - PSYCH 342 Human Perception: Applications to Computer Graphics, Art, and Visual Display*
   - INFO 345 Human–Computer Interaction Design
   - PSYCH 347 Psychology of Visual Communications
   - PSYCH 380 Social Cognition*
   - PSYCH 413 Information Processing: Conscious and Unconscious
   - PSYCH 416 Modeling Perception and Cognition
   - INFO 440 Advanced Human–Computer Interaction Design
   - INFO 450 Language and Technology
   - DEA 470 Applied Ergonomic Methods
   - *Students who take PSYCH 342 may also count its prerequisite, PSYCH 205, toward the Human-centered Systems primary/secondary track requirements. Similarly, students who take PSYCH 380 may also count PSYCH 280 toward the Human-Centered Systems primary/secondary track requirements. At most, one of PSYCH 205 or PSYCH 280 can be counted toward the primary/secondary track requirements.

2. **Information Systems**
   - INFO 330 Applied Database Systems
   - LING 424 Computational Linguistic
   - INFO 430 Information Retrieval
   - INFO 431 Web Information Systems
   - COM S 432 Introduction to Database Systems
   - COM S 465 Computer Graphics I
   - COM S 472 Foundations of Artificial Intelligence
   - LING 474 Introduction to Natural Language Processing
   - OR&IE 474 Statistical Data Mining
   - COM S 478 Machine Learning
   - OR&IE 480 Information Technology

3. **Social Systems**
   - SOC 304 Social Networks and Social Processes
   - AEM 322 Technology, Information, and Business Strategy
   - INFO 349 Media Technologies
   - INFO 355 Computers: From Babbage to Gates
   - ECON 368 Game Theory (formerly ECON 467)*
   - INFO 387 The Automatic Lifestyle: Consumer Culture and Technology
   - LAW 410 Limits on and Protection of Creative Expression—Copyright Law and Its Close Neighbors
   - S&TS 411 Knowledge, Technology, and Property
   - ECON 419 Economic Decisions Under Uncertainty
   - COMM 428 Communication Law
   - INFO 435 Seminar on Applications of Information Science
   - OR&IE 435 Introduction to Game Theory*
   - S&TS 438 Minds, Machines, and Intelligence
   - INFO 447 Social and Economic Data
   - ECON 477 Decision Theory I and II
   - *Only one of OR&IE 435 and ECON 368 can be taken for IS credit.

### The Minor

A minor in Information Science is also available to students in CALS. 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 GIS section of Courses of Study. Students are also referred to www.infosci.cornell.edu/ugrad/concentrations.html 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 development in low-income countries. The student typically specializes in a particular subject and works with an adviser to plan a program oriented toward international agriculture. The courses in International Agriculture and Rural Development are designed to acquaint students with the socioeconomic factors in agricultural development, the physical and biological nature of tropical crops and animals, and the various world areas for which study programs exist.
### Requirements

In addition to the college distribution requirements, students in International Agriculture and Rural Development must take a minimum of 36 credits toward the major. A minimum of seven credits in International Agriculture and Rural Development (IARD) are required. The foreign language requirement for the IARD major is identical to that of the College of Arts and Sciences (see page 416). Students are expected to complete an overseas field experience of a minimum of six weeks. The other courses recommended are drawn from a wide range of disciplines. The objective is to familiarize students with the many facets of agricultural development in low-income countries. Students are encouraged to take additional specialized courses in one of the other program areas of the college.

### 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 for the Minor

Four courses with significant international content, as recommended by students’ major departments (two should be from CALS).

One semester of the Global Seminar, IARD 480.

The foreign language requirement for the International Studies Minor is identical to that of the College of Arts and Sciences (see page 416).

An approved overseas experience (exchange, study abroad program, internship, or faculty-led short course).

For more information, contact the Academic Programs Coordinator in the International Programs Office, 607-255-3037.

### 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 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 two-year 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 theory, and 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

(please note that 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.)

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<thead>
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<th>Credits</th>
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<td>First Year</td>
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Second Year

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### Third Year

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### Fourth Year

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### Second Year

- **LA 491, Creating the Urban Eden: Woody Plant Selection, Design and Landscape Establishment** 4
- **LA 201, Medium of the Landscape** 5
- Biological sciences elective 3
- Social sciences or humanities elective 3
- Historical studies 3
- Total 18

### Third Year

- **LA 501, Integrating Theory and Practice** 5
- **LA 316, Site Engineering II** (second 7 weeks) 2
- Total 7
- **LA 318, Site Construction** 5
- Total 10

### Fourth Year

- **Total** 11

### Spring Term

- **LA 402, Integrating Theory and Practice: Community Design Studio** 5
- Total 7
- **LA 412, Professional Practice** 1
- Free elective 2
- Total 10

### Summary of credit requirements

- Specialization requirements 58
- Distribution electives 39
- Free electives 8
- Total 120
Master of Landscape Architecture (M.L.A.)
License Qualifying Degree
Requirements of the three-year M.L.A. curriculum include 90 credits, six resident units of satisfactory completion of the core curriculum courses, and a thesis or a capstone studio. (Please note that 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 Term**
- **LA 505**, Graphic Communication I (3 credits) 3
- Free electives 2
- **LA 501**, Composition and Theory 5
- Historical studies 3
- **LA 491**, Creating the Urban Eden: Woody Plant Selection, Design and Landscape Establishment 4

**Spring Term**
- **LA 502**, Composition and Theory 5
- **LA 492**, Creating the Urban Eden: Woody Plant Selection, Design and Landscape Establishment 4
- **Concentration** 2
- **LA 615**, Site Engineering I 3
- **LA 590**, Theory Seminar 3

Second Year

**Fall Term**
- **LA 601**, Integrating Theory and Practice 5
- **LA 616**, Site Engineering II 2
- Historical studies 3
- **Concentration** 6

**Spring Term**
- **LA 602**, Integrating Theory and Practice 5
- **LA 618**, Site Construction 5
- Historical studies 3
- **Concentration** 3

Third Year

**Fall Term**
- **LA 701**, Urban Design and Planning 5
- Free elective 3
- **Concentration** 4

**Spring Term**
- **LA 800**, Master's Thesis in Landscape Architecture 9
  - or **LA 702**, Advanced Design Studio 5
  - **LA 412**, Professional Practice 1
- Free elective(s) 2 or 6

Summary of credit requirements
- Specialization requirements 64 or 68
- **Concentration** 15
- Free electives 7 or 11
  - 90

Master of Landscape Architecture
Advanced Degree Program. The two-year Master of Landscape Architecture (M.L.A./A.D.) program serves to broaden and enrich undergraduate education in design by providing an expanded educational experience to those who are technically skilled. Applicants must hold a bachelor's degree in landscape architecture or architecture from an accredited program. The objective of the two-year (M.L.A./A.D.) program is to develop specializations for individuals who may wish to teach, practice, or conduct applied research in landscape architecture.

Students admitted to the two-year M.L.A./A.D. program are required to complete 60 credits of coursework as approved by the members of their graduate committee. For landscape architects, this must include at least two advanced studios, a seminar, a concentration, and a thesis. For architects, the curriculum requires three advanced studios, two courses in plants and planting design, two courses in the history of landscape, two courses in site engineering, a seminar in design theory, a course in professional practice, a concentration, and electives.

Undergraduate Minor for Nonmajors
Students outside the professional program may choose the undergraduate minor (five courses, 15 credits) in Cultural Landscape Studies to complement their major. A variety of courses consider the cultural landscape as an object, something to be studied for its own sake, and as a subject, as 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, Landscape Architecture, 440 Kennedy Hall.

Courses: choose five for a total of 15 credits
- **LA 140**, The Symbols of New York State's Cultural Landscape (3 credits)
- **LA 155**, American Indian Cultural Landscapes: Changes in Time (3 credits)
- **LA 260**, Pre-Industrial Cities and Towns of North America (3 credits) offered alternate years
- **LA 261**, Urban Archaeology (4 credits)
- **LA 262**, Laboratory in Landscape Archaeology (3 credits)
- **LA 263**, American Indians, Planners, and Public Policy (3 credits), offered alternate years
- **LA 282**, The American Landscape (3 credits)
- **LA 483**, Seminar in Landscape Studies (3 credits)
- **LA 497**, Independent Study (1-5 credits)
- **LANAR 524**, History of European Landscape Architecture (3 credits)
- **LANAR 525**, History of American Landscape Architecture (3 credits)

Natural Resources
As the number of humans living on the Earth surpassed six billion at the start of the twenty-first century, knowing how to conserve and manage well our Earth's remaining biological resources and natural environments takes on increasing importance and urgency. The field of Natural Resources sits squarely at the interface of science and policy, applied to these important conservation and environmental challenges. This is a biologically based major that focuses on the interface of nature (species, populations, communities, and ecosystems) with the human institutions involved in environmental conservation and management. The major's focus on biological resources (e.g., fisheries, wildlife, forests, and wetlands) includes issues of conservation and restoration of scarce species and their habitats, sustainable harvest of species of economic importance, management of invasive species and overabundant species, population dynamics in aquatic and terrestrial environments, ecosystem and watershed management, and mitigating the effects of human-induced changes on the environment.

The mission of the Department of Natural Resources, home of the major, is "to develop knowledge and facilitate learning to improve society's stewardship of natural resources and the environment." A commitment to undergraduate education is a vital component of that mission. For more information see www.dnr.cornell.edu. The curriculum emphasizes the biology and ecology of natural systems, as well as the social science/human aspects of conservation challenges. The major allows students flexibility to pursue a variety of paths to understand the scientific, ethical, and societal basis for management and protection of natural resources and environments through the application of ecological principles and knowledge of societal needs.

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 humans and the environment. An undergraduate degree in natural resources gives students the concepts and tools needed to participate intelligently and effectively in decisions that determine the future of our environment, either as natural resources professionals or as informed citizens.

Career opportunities in natural resources are diverse. The major prepares students for graduate school or 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 sectors. Many students ultimately pursue graduate studies in environmentally related fields including the biological, physical, and chemical sciences; forest, wetland, stream, wildlife, or fisheries.
management, and environmental law and public policy. Graduates often assume leadership positions in government, colleges and universities, 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. You 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 "Population, Values, and Natural Resources." Juniors complete three core courses, "Applied Population Ecology," "Applied Ecosystems Analysis," and "Natural Resources Management and Planning." These foundation and core courses emphasize the science-based conservation and natural-resource issues confronting society, and develop the conceptual and methodological tools that students will use in upper-division courses.

**Areas of Concentration**

The concentration in **Applied Ecology** provides students with advanced study of (i) species and population biology and (ii) ecosystem functions, with an emphasis on the conservation or management of organisms and their habitats. Course work in the department emphasizes the science-based conservation of fish and wildlife populations and their habitats, conservation biology, quantitative resource management, global ecology, and wetland and landscape management. Electives include a broad list of courses offered in the department and in other departments (such as in Crop and Soil Sciences, Earth and Atmospheric Sciences, Ecology and Evolutionary Biology, and Plant Biology).

The concentration in **Resource Policy and Management** provides students with advanced study in the institutions and policy that humans apply to resource management, providing a foundation for students who wish to pursue careers or advanced study in natural resources and environmental policy, law, or environmental education and communication. Course work in the department focuses on human dimensions of natural resources and ethics and values. Electives include a broad list of courses offered in the department and in other departments (such as in Applied Economics and Management Planning, Ecology and Evolutionary Biology, Government, and Development Sociology), including topics such as environmental governance and environmental law.

The concentration in **Environmental Studies** is intended for those students desiring a broad program of study regarding the interactions of humans and their environment. The concentration emphasizes the ability to think critically about those interactions. Each student, with help from his/her departmental adviser, designs a cohesive sequence of five upper-division courses in the social sciences, natural sciences, and/or humanities related to the environment. The sequence constitutes a theme that identifies a specific set of interactions between humans and their environment that the student wishes to pursue in depth. Some examples are: (i) the legal and economic incentives for species conservation, or (ii) studying human views of the environment as expressed in literature or history.

**Research and Work Opportunities for Undergraduates**

The department offers many opportunities for field-oriented student 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 Adirondack Biological Field Station on Oneida Lake near Syracuse, and the Hubbard Brook Experimental Forest in New Hampshire, as well as numerous natural areas near campus. Part-time jobs in the research and extension programs of many faculty members offer students opportunities for career-related work experience. A Research Honors Program is available for qualified students.

For a comparison of the Natural Resources major with other environmental majors, see www.ner.cornell.edu/teaching/ugrad/lac_cal_env.pdf.

**Nutrition, Food, and Agriculture**

Nutritional sciences draws upon chemistry, biology, and the social sciences to understand complex relationships among human health and well-being, food and lifestyle patterns, food and agricultural systems, and social and institutional environments.

The program in nutrition, food, and agriculture provides students with strong training in human nutrition in the context of an understanding and appreciation of the agricultural and life sciences. The program responds to the growing and important interrelationships among human nutrition and the agricultural and life sciences. Growing public interest in health and nutrition has placed new demands upon food producers, processors, and retailers. The problems of hunger and malnutrition in the United States and abroad require that nutritionists work with specialists in areas such as agricultural economics, for human nutrition, and development sociology. Advances in biotechnology provide researchers with new ways to understand human nutritional requirements and the regulation of human metabolism.

Nutrition, food, and agriculture majors complete a core set of requirements and choose elective courses in the areas of their particular interest. The core curriculum includes introductory chemistry and biology, organic chemistry, biochemistry, physiology, and mathematics. Students complete five courses in nutritional sciences: NS 115, Nutrition, Health and Society; NS 245, Social Science Perspectives on Food and Nutrition; NS 345, Nutritional and Physiological Aspects of Foods; NS 351, Physiological and Biochemical Bases of Nutrition; and NS 352, Methods in Nutritional Sciences. In addition, students select a minimum of three advanced courses in nutritional sciences as well as elective courses in the broad areas of food production and processing, food and agricultural policy, the life sciences, environment and natural resources, communication, and education.

All majors have faculty advisers in the Division of Natural Resources with whom they meet regularly. Advisers 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 engage in field experiences for credit during the academic year or summer. Placements in laboratories, industries, or community agencies are possible.

The major in nutrition, food, and agriculture can lead to many different career paths. By supplementing the core requirements with courses in different areas, students can prepare for jobs in industry, government, or community agencies in the United States or abroad. The major is excellent preparation for graduate study in a variety of fields.

The Division of Nutritional Sciences is affiliated with both the College of Agriculture and Life Sciences and the College of Human Ecology. Most of the division faculty members work in Savage-Kinzelsberg 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 nutrition, food, and agriculture program, contact the Division of Nutritional Sciences Academic Affairs Office, 335 MVR, 607-255-2628, e-mail: 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 115, Nutrition, Health, and Society, plus nine credits of 200-level or above didactic NS courses. Enrollment is limited in some courses. Please check www.nutrition.cornell.edu/undergrad/calsminr.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 to use 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 Plant Pathology, representing the strongest groups of plant scientists in the world. Students in the program share a common interest in learning about topics associated with plant growth and development in the broadest sense, but beyond that common thread, individual career goals vary widely. Some have their sights set on careers in applied agriculture, others plan to contribute to advancements of our knowledge by way of teaching or research, and still others see study in plant science as a stepping-stone to specialized training in business, government, or law. In addition to the college distribution requirements, Plant Science majors must take at least one course in each of several areas including botany, plant physiology, ecology, taxonomy/systematics, genetics, statistics, plant-pest interactions, crop production, and soil science, for a total of 40 credits.

Students who begin with well-defined interests or who identify certain areas of interest after several semesters of course work may choose a specialization within one of the five cooperating departments. Each specialization has additional requirements beyond the basic core courses. However, students who are uncertain about the breadth of their interests or who are seeking as much flexibility as possible may choose to design their course of study in Plant Sciences without declaring a specialization. Those students develop a strong background in plant science but have fewer required courses so that they can explore other areas of interest.

More than one hundred courses that deal directly with some area of plant science are offered by the cooperating departments, and other courses relating to plant science are offered elsewhere in the university. There are also ample opportunities for internships, undergraduate teaching, and research experience. Qualified students, especially those expecting to go on for graduate degrees, are encouraged to avail themselves of such opportunities. Students who are planning to enter the 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-related or maintenance-related industry such as a lawn and tree care company, commercial greenhouse, nursery, orchard, vineyard or winery, botanical garden or arboretum, crop production farm, or with Cooperative Extension. Plant Sciences faculty members also encourage students to avail themselves of opportunities to work and study abroad. In addition to classrooms and laboratories in five buildings on the Cornell campus proper, research and teaching facilities adjacent to the Cornell 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 range of facilities for golf study, 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 and Agronomy** are specializations that focus on the science and management of the major food and feed crops of the world such as wheat, corn, rice, soybeans, and alfalfa. In addition to several courses in crop science, students in this program also take courses in the sister disciplines of weed science and soil science. At present, the specialization is described in detail under the major field of study called Crop and Soil Sciences, but it will become a part of the Plant Sciences major field of study in the near future.

**Enology and Viticulture.** The College of Agriculture and Life Sciences announces 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 (E/V) 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 Food Science 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 a "minor" in Plant Sciences (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 programs, as well as the general requirements of the college. The curriculum will consist of core coursework 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 in 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 in farms and gardens, parks and landscapes, and athletic and recreational facilities; indoor plants; greenhouse and nursery plant production; and crops used for wines, herbs and spices, medicinal purposes, and coffee and teas. The knowledge and skills essential to grow, maintain, propagate, and manage horticultural crops are high in demand in a world increasingly concerned with environmental quality, recreation, and health.

There are about 40 faculty members in horticulture—specializing 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 101 Horticulural Science and Systems** (4 credits)
- **HORT 400 Plant Propagation** (3 credits)

Two HORT courses in plant production or management at the 400 level (6 credits)

One additional course of integrated pest management (plant pathology, entomology, or weed science) beyond the 3 credit Plant Sciences core requirement (3 credits)

Students transferring into Cornell from other colleges have the option to pursue an additional degree or major in Plant 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 Genetics and Breeding** relates information about genetics/genomics of plants to the improvement of cultivated plant species. Agricultural crops of economic importance 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 PL BR 201, 403, 404, and BIOP 343. Other courses may be included after consultation with the adviser. Students are encouraged to participate in research projects and take advantage of opportunities for internships in industry.

**Plant Pathology** is the study of plant diseases caused either by microorganisms or by chronic exposure to toxic elements in air and water. At the very least, specialists in the field must learn how to identify plant diseases and to design management strategies that will limit their overall impact. However, by employing contemporary tools from molecular biology, plant pathologists are also well positioned to answer fundamental questions about the nature of host-pathogen interactions and the genes that control these. These new tools has already led to rapid deployment of disease-resistant crop varieties and it promises to offer much more in the future. For most students, a concentration in plant pathology as
an undergraduate is preparation for graduate study in the field. However, graduates may also be employed as representatives with agrimines, regulatory, and laboratory technicians. Suggested courses beyond the Plant Sciences core include organic chemistry, biochemistry, calculus, introduction 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 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 in 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 twenty-first century. The SES major has its home in the Department of Earth and Atmospheric Sciences, but relies on the collaboration of several 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, and biogeochemistry. These classes emphasize the interconnectedness of the Earth system, and are treated as a discipline from different traditional disciplines. 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. Possible areas of concentration include biogeochemistry, ecological systems, environmental geology, ocean sciences, climate dynamics, hydrological systems, and soil science.

The SES major provides a strong preparation for graduate school in any one of the Earth system sciences, such as atmospheric sciences, geology/geophysics, oceanography, hydrology, ecology, and biogeochemistry. Students seeking employment with the B.S. degree will have many options in a wide variety of environmentally oriented careers in both the private sector and government. Students with the strong science background provided by the SES major can also highly valued by graduate programs in environmental law, public affairs, economics, and public policy.

The requirements for the major are as follows:

1. **Basic Math and Sciences**
   - MATH 190 or 191, and MATH 192 (or MATH 111, 112)
   - PHYS 207 and 208 (or PHYS 112, 213)
   - CHEM 207 and 208
   - BIOGD 101/103/102/104 (or 105-106) or BIOGD 109/110
   - Three additional 3-4 credit courses in basic science and math, generally at the 100 and 200 level. At least one of the following courses must be included in the selection:
     - GEOL 201 Physics and Chemistry of the Earth
     - BIOEE 261 Ecology and the Environment
   - Other examples are MATH 293 and MATH 294, biochemistry, organic chemistry, PHYS 214, and introductory statistics. With the exception of the introductory statistics course, the additional basic courses will require at least one of the classes listed above as a prerequisite.

2. **Science of Earth Systems Core Courses**
   - Three 4-credit courses that emphasize the interconnectedness of the Earth system are required. These courses are focused on the most modern views of the planet as an interactive and ever-changing system, and each crosses the traditional boundaries of disciplinary science.
   - EAS 302 Evolution of the Earth System
   - EAS 351/ASTRO 331 Climate Dynamics
   - EAS 321/NATRES 321 Biogeochemistry

3. **Concentration Courses**

   Four intermediate to advanced-level courses (300-level and up) that build on the core courses and have prerequisites in the basic sciences and mathematics courses are required. These build depth and provide the student with a specific expertise in some facet of Earth system science. The concentration should be chosen before the junior year in consultation with an SES adviser whose interests match those of the student.

   Freshmen are encouraged to enroll in EAS 103, the SES Freshman colloquium offered in the fall semester. For more information, contact Stephen Colucci, Department of Earth and Atmospheric Science, sjc25@cornell.edu, and visit the web site: www.geo.cornell.edu/ses.

**Science of Natural and Environmental Systems**

Environmental stewardship and sustainability are increasingly recognized as human and planetary imperatives. Graduates who understand how people both generate and can resolve environmental problems will contribute significantly to creating a sustainable environment for our own and future generations. This new major in environmental science provides a broad-based, integrative program in the physical, biological, social, and economic sciences, as well as disciplinary strengths in one or more subjects suitable for entry-level professional positions or post-baccalaureate studies.

The curriculum comprises an intensive foundation in the sciences; an environmental core with courses covering earth, biotic, social, and economic systems; and several disciplinary programs of study. This major emphasizes inter- and multidisciplinary work, independent thinking and analysis, and development of competency in writing and speaking throughout the curriculum.

**Foundation Courses**

The foundation courses, listed here, can be used to fulfill many of the CALS distribution requirements. 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.

- 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

**NTRES 201 Environmental Conservation**

**DEA 150 Introduction to Human-Environment Relationships**

The freshman and sophomore years are designed to provide foundation courses and meet CALS requirements at the outset. The freshman year provides engagement with environmental study through DEA 150 and NTRES 201, with major-specific sections for these two courses. Depending on student interest and available time, other courses in environmental study may be taken as electives early in the schedule.

Advanced Placement credit will be accommodated in the program through consultation with the student's faculty adviser.

**Environmental Core**

The environmental core consists of five 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. DEA 150 will provide the required core understanding of human behavior related to environmental issues. AES 115, required in the freshman year, provides a unifying overview of the goals, facts, 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.

Environmental Science: ALS 115 Environmental Science: Core Principles
Earth systems: CSS 365 Environmental Chemistry: Soil, Air, and Water
Biotic systems: BIOE 261 Ecology and the Environment
Economic systems: AEM 250 Environmental and Resource Economics
Social systems: D SOC 324 (STS 324, SOC 324) Environment and Society

Programs of Study
Programs of study that focus in one or more areas of environmental science are being established to provide disciplinary expertise sufficient for entry-level 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 will not replace or duplicate current majors. Rather, they will provide the basic core of knowledge essential for an introductory understanding of the area—the concepts, basic science, methodologies, and major applications.

Proposed programs of study are:
- Environmental Biology
- Environmental Information Science
- Sustainable Development
- Agroecosystem Science
- Environmental Economics

If established programs of study do not meet the student’s interests and needs, the student may propose a program of study, in collaboration with a faculty mentor and subject to approval by the Faculty Program Committee.

Freshmen are encouraged to enroll in the introductory Environmental Science course. For more information about this major, see the website at http://snes.cas.cornell.edu or visit the undergraduate program office in 12 Fernow Hall, or send e-mail to sw38@cornell.edu.

Special Programs in Agriculture and Life Sciences

General Studies. The opportunity to develop an independent major in General Studies is available for students interested in pursuing a general education in Agriculture and Life Sciences. In consultation with a faculty adviser, students may plan a sequence of courses suited to their individual interests, abilities, and objectives in an area not encompassed by the existing programs. 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.

Students completing this major are often planning a career in agriculturally related food and service enterprises. Many of the fast-growing occupations require the broad perspective, the scientific and technical skills, and the analytical ability that a general education fosters.

General Studies includes production agriculture as well as technical work in the agricultural and life sciences. Many biotechnology graduates deal with aspects of agriculture, especially plants, crops, and ecosystems in the natural environment. A strong grounding in biological sciences as well as knowledge of the agricultural sciences is essential in this rapidly growing field. Students should plan basic coursework in the major areas of study in the college—animal sciences, plant sciences, environment and technology, agroonomic sciences, biophysical sciences, and social sciences. Advanced courses may be selected in these and other areas of individual interest or career aspiration. A course of study for a special program must be planned with and approved by a college faculty adviser. Information on the options and names of faculty advisers prepared to advise in special programs are available in the Counseling and Advising Office, 140 Roberts Hall.

Agricultural Science Program

Many students wish to pursue a general education in agriculture to prepare for careers that require knowledge of food systems and natural resources, such as production and marketing of foods (animals and plants) and ornamental plants, agricultural education in secondary schools, cooperative extension, food systems, and crop consultants. The Agricultural Science program is designed to allow students to work with their adviser in developing a curriculum that best meets the needs of each individual student. In this program, students can gain a broad exposure to the agricultural courses across the college. The program is very flexible and allows students to develop a general course of study or to select one or two areas of concentration.

All students are required to take the core courses. Concentrations requiring at least 12 credits are available in Animal Science, Applied Economics and Management, Education and Communication, and Plant Sciences/Agronomy.

Students will gain practical experience through special projects, extracurricular activities, and/or internships. Opportunities are available in research and outreach experiences, and in summer employment, which enrich the practical experience. Students will engage in group activities and will participate in discussions with faculty and other experts in various sectors of the agricultural industry.

AIS 100 Introduction to American Indian Studies

Fall. 3 credits. T R 1:25-2:40 plus sections. L. Elm

Slide lectures survey the rich cultures and complex histories of the Indian nations north of Mexico. Indian arts and philosophies are compared and contrasted with those of Europe, Africa, Asia, Canada, and the United States. The origins of today's major legal issues involving American Indians are also discussed. The course begins with a survey of Indian America before Columbus and ends at the Wounded Knee in 1890, the event that marks the end of the conquest of Indian America. Guest lecturers, including American Indian leaders, provide additional perspectives.

AIS 175 Issues in Contemporary American Indian Society (also D SOC 175)

Spring. 3 credits. M W 11:15-12:05 plus sections. L. Elm

This course addresses major U.S. policies affecting American Indians in the twentieth century, and ways American Indians pursued strategies to sway the process of social change. American Indian political, social, and cultural issues are examined through history, literature, art, and film. The approach of this course is interdisciplinary and an emphasis is placed on the study of American Indians as living cultures. Current events are discussed, and the implications for American Indians in the twenty-first century are explored. Guest lecturers, including American Indian scholars and leaders, provide additional perspectives.
AIS 230  Cultures of Native North America (also ANTHR 230)  
Fall. 3 or 4 credits. M W F 11:15-12:05. B. Lambert.  
A survey of the principal Inuit and American Indian culture area north of Mexico. Selected readings are examined to bring out the distinctive features of the economy, social organization, religion, and worldview. Although the course concentrates on traditional cultures, some lectures and readings deal with changes in native ways of life that have occurred during the period of European-Indian contact.

AIS 236  Native Peoples of the Northeast, Pre-Contact to the Present (also HIST 236 and AM ST 236)  
After an initial, hostile series of economic and military exchanges with Europeans beginning off the coast of Maine in 1524, the native peoples of northeastern North America have undergone a fascinating and dramatic series of transformations. Adopting an interdisciplinary perspective, this course will analyze the history of Native Americans in the Northeast from a variety of perspectives. Readings and discussions will be drawn from a wide range of secondary and primary sources, including historical documents, traditional narratives, archaeological reports, the Internet, and museum exhibits of material culture. The class will emphasize critical reading of texts and discussion.

AIS 260  Survey of American Indian Literatures in the United States (also ENGL 260)  
The purpose of this course is to provide an introduction to U.S. American Indian literatures, both oral and written. The method of studying these literatures will emphasize historical, legal, and cultural contexts as well as current critical debates over methodological approaches. In addition to examples of the oral tradition and primary sources, including historical documents, traditional narratives, archaeological reports, the Internet, and museum exhibits of material culture. The class will emphasize critical reading of texts and discussion.

AIS 266  Introduction to Native American History (also HIST 266 and AM ST 266)  
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 in the history of North America's indigenous peoples by taking an issues-oriented approach. 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. Additionally, the course will provide numerous opportunities for students to develop their critical thinking and reading skills.

AIS 311  Social Movements (also D SOC 311 and LSP 311)  
Social movements are collective efforts by relatively powerless groups of people to change society. Typically conceptualized as political activity outside the institutional framework, social movements are "politics by other means." This course examines the transnational dimensions of social movements to assess the implications of globalization for political mobilization and the ways that social movement actors engage the global political process to effect social change. Under what circumstances do movements emerge? How do global processes shape both domestic and transnational political mobilization? How do movements internally organize and choose political tactics and strategies to achieve their goals? How have social movements changed history, identities, society, and politics? This course addresses these and related questions through an examination of indigenous peoples movements in the United States, Canada, and Latin America.

AIS 340  Contested Terrain: Hawaii  
Spring. 3 credits. Prerequisite: one introductory level course in the social sciences or history. F 8-11; one Saturday a month 8-11. M. M. Hanahata.  
This course draws from the fields of history, political science, and cultural studies 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.

AIS 353  Anthropology of Colonialism (also ANTHR 353)  
Spring. 4 credits. A. Simpson.  
This course examines the relationship between colonialism and anthropology and the ways in which the discipline has engaged this global process locally. One of our aims in this course is to gain an appreciation of colonialism both as a theory of political legitimacy and as a set of governmental practices. As such, we will re-imagine North America in light of the colonial project and its technologies of rule such as education, law, policy—that worked to transform indigenous notions of gender, property, and territory. We will come to appreciate the ways in which these forms of knowledge and practice advanced the settlement of space and place and both settled and unsettled peoples. This course will be comparative in scope but will be grounded within the literature from Native North America.

AIS 361  Sociology of American Indians (also D SOC 360)  

AIS 367  American Indian Politics and Policy (also GOVT 357 and D SOC 357)  

AIS 368  Contemporary American Indian Fiction (also ENGL 367)  
This course will look at contemporary American Indian fiction as a response to the colonial structure of federal Indian law. Beginning with Dorothy Rogers' Cora, a novel of the Allotment Era, we will 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 435/635  Indigenous Peoples and Globalization (also D SOC 435/465)  
Fall. 3 credits. Prerequisite: undergraduate, permission of instructor. S-U grades optional. Limited to 25 students. R 1:25-4:45. 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. Globalization, whether under the auspices of the World Trade Organization and regional economic agreements such as the NAFTA or the deterritorialization of social and political arrangements contemporaneous with modernization or the expansion of communication technology and its impact on traditional knowledge systems, have had profound social, cultural, and economic impacts on indigenous peoples. At issue are the lands, resources, traditional knowledge, intellectual and cultural property, and indigenous struggles for recognition and self-determination.

AIS 450  Practicum in American Indian Studies  

AIS 486  American Indian Women's Literature (also ENGL 486)  
Spring. 4 credits. R 10:10-12:05. L. Donaldson.  
This course explores the development of women's literature in a variety of different American Indian cultures. We attend to native paradigms of cultural production such as women's songmaking, weaving, basketmaking, and storytelling, as well as the appropriation of European literary forms such as the novel. We read a diverse range of materials including novels, autobiography, poetry, drama, and short stories.

AIS 490  New World Encounters, 1500-1800 (also HIST 490 and AM ST 499)  
The discovery of the Americas, wrote Francisco Lopez de Gomara in 1552, was "the greatest event since the creation of the world, excepting the Incarnation and Death of Him who created it." 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 conceptually early European encounters 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' ability to reflect critically on these documents, taking into account the perspective of both the colonizers and the colonized.

AIS 497  Independent Study  
Fall or spring. 1-4 credits. Staff.  
Topic and credit hours to be mutually arranged between faculty member and student. The American Indian Program Office must approve Independent Study forms.

AIS 600  American Indian Studies  
4 credits. Staff.
AIS 726 Federal Indian Law: The Legal Construction of Indian Country (also LAW 726)
Spring. 3 credits. S-U option unavailable. Limited enrollment. Students who have taken LAW 608, American Indian Law, are not precluded from taking this seminar as well. E. Cheyfitz. For description, see LAW 726.

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 at the front of this catalog (see p. 25).

NONDEPARTMENTAL COURSES

ALS 101 Transition and Success at Cornell
Fall. 1 credit. Prerequisites: must be an entering student in CALS. Letter grade only. B. O. Earle and CALS Career Development Office.

Discussion-oriented course to enable all new CALS students to enjoy their experience at and transition to Cornell. Lecture, discussion, guest speakers, student panels, and assignments that explore Cornell's history, academic opportunities, services, and organizations are used. Emphasis on role of Agriculture and Life Sciences in future of all related careers.

ALS 115 Environmental Science: Core Principles
Spring. 3 credits. Letter grade only. Lec: T R 10:10-11:00, lab: R 1:00-4:00. E. L. Madsen.

Environmental science is the multidisciplinary study of how the Earth works, how to contend with environmental change, and how humans influence and manage the Earth's life-support systems. This course highlights facts and principles from the physical, chemical, biological, social, and economic sciences. The readings, case studies, discussions, field/labory experiences, and research topics are designed to unify the curriculum for students majoring in the Science of Natural and Environmental Systems (SNES).

ALS 134 Emergency Medical Technician
Fall and spring. 3 credits each semester. Two-semester course. S-U grades optional. Prerequisite: none—but basic or advanced first aid is recommended. Lec: M 1:30-4:30; lab: W 1:30-4:30, D. A. Grossman, P. Rach, and A. E. Gantort.

This is an intensive 140-hour course taught throughout the fall and spring semesters. Enrollment, therefore, occurs in the fall term only. Course includes training in C.P.R. for the professional rescuer, oxygen administration, airway management, fracture management, bleeding control, patient assessment, spinal immobilization, the use of medical antishock trousers, and defibrillation. Students will qualify for the New York State E.M.T. Certification Exam upon successful completion of the course.

ALS 135 Advanced Emergency Medical Technician, Critical Care
Fall and spring. 4 credits each term. Two-semester course. S-U grades optional. Prerequisite: must be currently certified as a N.Y.S. Basic E.M.T., or have applied for reciprocity. Lec: T 1:30-4:30, lab: R 1:30-4:30. Sat 9:00-12:00. D. Grossman, P. Rach, D. Spaulding.

Advanced Emergency Medical Training includes topics such as Emergency Pharmacology, Principles of Advanced Cardiac Life Support, Emergency Hypoperfusion Management and Basic Trauma Life Support. Classroom, lab, hospital, and field sessions are used to teach skills such as intubation, emergency IV access, electrocardiography and defibrillation, and patient assessment and pharmacological intervention. Extensive out of classroom (exceeds 140 hours) time is required.

ALS 400 Internship
Fall, spring, or summer. 6 credits maximum. Not open to students who have earned internship credits elsewhere or in previous terms. S-U grades optional. Students may register only for internships in the New York State Assembly Intern Program, the New York State Senate Session Assistant's Program, and the Albany Semester Program. A learning contract is negotiated between the student and the faculty supervisor(s), stating conditions of the work assignment, supervision, and reporting. Participation is required in any structured learning activities associated with the internship.

ALS 402 Agricultural Study Tour to Burgundy, France
Spring. 2 credits. Prerequisite: must be a registered CALS student. S-U grades optional. L. A. Weston and P. Durand.

A two-week study tour held in the month of May in Burgundy, France. Students experience French agriculture, history, and cuisine. Tour includes wine, fruit, vegetable, cheese, dairy, beef, and poultry production, and French university facilities featuring modern agricultural research. Ten- to 20-page paper requirement. Students travel throughout Burgundy and eastern France with Pascal Durand, professor at ENESAD in Dijon France.

ALS 403 Internship Opportunities in Burgundy, France

Six to eight-week internship experiences in Burgundy, France. In agriculture, related subject areas including viticulture, agribusiness, agronomy, food science, and biotechnology. Final paper documenting internship experience required.

ALS 477 Environmental Stewardship in the Cornell Community

Each student undertakes an original project to improve the environment at Cornell while working with a faculty adviser and the Cornell infrastructure (generally campus life and/or facilities). Through class discussions, students learn how to be more effective at developing environmental programs in the future, both during and after college. The final written project report is also presented orally at a public forum. (Note: If students prefer to take one or two credits of independent research in a department in the College of Agriculture and Life Sciences, this can be arranged. Assistance in finding a faculty adviser is provided. This course may be taken more than once.)

ALS 481 Global Conflict and Terrorism
Spring. 3 credits. Lec: M 7:30-9:30, sec, R 2:30-4:30, J. Shanahan.

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. The course is designed to be interactive and allows the class to actively engage the students. The weekly discussion section focuses on discussing in greater depth the readings assigned.

ALS 494 Special Topics in Agriculture and Life Sciences
Fall or spring. 4 credits maximum. S-U grades optional.

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 500 Politics and Policy: Theory, Research, and Practice (also AM ST 501, PAM 406, and GOVT 500)
Students in the College of Agriculture and Life Sciences must register for ALS 500.

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 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; 2) field experience; and 3) individual research papers or projects. All three components are based learning, field experience, and individual research. Applications are made through the Cornell in Washington office, M101 McGraw Hall.

ALS 661 Environmental Policy (also B&SOC 461 and BioEE 661)
Fall and spring. 3 credits each term. (Students must register for 6 credits each term since an "R" grade is given at the end of the fall term.) Limited to 12 students. Prerequisite: permission of instructor. Sem, R 2:30-4:30. D. Prinn.

This course 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.
APPLIED ECONOMICS AND MANAGEMENT


Courses by Subject

Farm management, agricultural finance, and production economics: 302, 403, 404, 405, 608, 708

Statistics, quantitative methods, and analytical economics: 210, 410, 411, 412, 415, 417, 419, 711, 712, 713, 714, 717


Policy and international trade: 230, 335, 336, 341, 342, 433, 434, 436, 630, 632, 633, 634, 730, 735


Environmental and resource economics: 250, 450, 451, 555, 651, 655, 750

Economics of development: 464, 660, 667, 762, 765

Consumer economics: 670

General, contemporary issues, research, and other: 101, 200, 380, 494, 497, 499, 609, 698, 699, 700, 800, 900, 901

AEM 101 Introduction to Applied Economics and Management

Fall. 3 credits. Required of and limited to freshmen in Applied Economics and Management. S-U grades only.


This freshman transition course explores the major courses of study available to AEM students, including a discussion of "hot topics," research, and career paths in each field. Numerous AEM faculty members are guest preservers. Students are introduced to campus resources such as the library system, study abroad opportunities, course planning, career planning, and learning strategies. Short written assignments and acrive group participation are required.

AEM 120 Foundations of Entrepreneurship and Business

Fall. 3 credits. P. D. Perez.

An introductory course, providing a sound base to both the understanding of entrepreneurial activity and possibilities and the study and practice of entrepreneurship at Cornell. The course will include lectures, selected guest appearances by successful entrepreneurs, and extensive use of IT-based learning and presentation tools.

AEM 222 Business Management Case Analysis

Spring. 1 credit. Required of and limited to AEM majors in AEM 220; others admitted by permission of instructor. P. D. Perez.

The course offers students, working in teams, the opportunity for hands-on application of general business management concepts through discussion and analysis of a series of cases. Additional students may be accommodated on a space-available basis with permission of the instructor. Case topics are closely coordinated with both the content and sequencing of material presented in AEM 220.

AEM 230 International Trade and Finance [also ECON 230]

Spring. 3 credits. Prerequisites: ECON 101 or equivalent required; ECON 102 or equivalent recommended. 1 evening prelim. S-U grades optional. D. R. Lee.

This course provides a one-semester introduction to international economic principles and issues. The course first surveys key topics such as the elements of comparative advantage, tariff and non-tariff 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. Current issues such as the effects of trade liberalization, trade and economic growth, and the viability of international capital markets are discussed throughout. This course is designed as a less technical introduction to concepts developed at a more advanced level in AEM 430 and ECON 361-362.

AEM 240 Marketing

Fall. 3 credits. E. W. McLaughlin.

This course provides a broad introduction to the fundamentals of marketing. The components of an organization's strategic marketing program, including how to price, promote, and distribute goods and services to people are explored. Industry guest lectures and current marketing applications from various companies are presented and analyzed. Concurrent enrollment in AEM 241 is required for AEM majors.

AEM 241 Marketing Plan Development

Fall. 1 credit. Required of and limited to AEM majors. D. J. Perosio.

The course offers students, working in 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 250 Environmental and Resource Economics

Spring. 3 credits. S-U grades optional. G. L. Poe.

The objectives of this course are to introduce fundamental economic principles and the "economic approach" to policy issues, and to demonstrate how these concepts underpin contemporary environmental and natural resource issues and policy solutions. Subjects include valuation, benefit-cost analysis, policy design, property rights, and ecological economics. These tools are used to explore major current policy issues such as economic incentives in environmental policy, endangered species protection, air and water pollution, depletion of renewable and non-renewable resources, and global warming.
AEM 302 Business Law I (also NBA 560)
Fall and summer. 3 credits. Limited to seniors, juniors, and graduate students.
Prerequisite: a course in business law or permission of instructor. D. A. Grossman.
Examines legal problems of particular interest to persons who expect to engage in business. Emphasis is on the law of contracts, sales, agency, and property.

AEM 320 Business Law II (also NBA 561)
Spring. 3 credits. Limited to juniors, seniors, and graduate students.
Prerequisite: a course in business law 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 of the course reviews selected topics in business law, like employment discrimination, debtor/creditor relations, product liability, unfair competition, e-commerce law, and international business law.

AEM 321 Information Technology Management (also H ADM 449)
Fall. 3 credits. Priority given to juniors and seniors. Staff.
This class explores international technology marketing from an economics perspective using biotechnology as an example. Topics include technology theories, products, risk (health and environmental) regulation, public technology policy, and international conventions. The class is of interest to students of biotechnology, public technology policy, and international technology marketing.

AEM 322 Information Technology Strategy
Spring. 3 credits. Limited to juniors and seniors. Staff.
For description, see H ADM 449.

AEM 327 Technological Change and Innovation Strategy
Spring. 3 credits. Limited to juniors and seniors. Staff.
This course explores innovation and technological change. We will study how technological change affects economies and industries, and how innovation of new products, processes, and services takes place in firms. The focus is on the creation, management, and exchange of knowledge within and across organizational boundaries.

AEM 330 Managerial Economics and Decision Making
Spring. 3 credits. Limited to juniors and seniors. Staff.
This course focuses on the theories of buyer behavior, with specific emphasis on the tools of managerial analysis and decision making, in the context of the microeconomic theories of demand and cost functions. Students will consider issues such as how to estimate a firm’s demand and cost functions as considered in making such decisions. The course compares standard microeconomic models with more realistic approaches to marketing decisions. The emphasis is on considering decisions that are less stylized and more similar to those managers face on a regular basis.

AEM 334 Women, Leadership, and Entrepreneurship
Fall. 1 credit. D. Streeter.
This seminar makes use of lectures, guest panels, and readings to focus on issues facing women in both business and their business careers. Sessions include topics such as: 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 340 Futures and Options Trading
Fall. 3 credits. Limited to juniors and seniors. Priority given to CALS juniors and seniors, then out of college seniors.
Prerequisites: ECON 101, EDUC 115, and AEM 210 or equivalent. Staff.
The focus of the course is on the use of futures and options as risk management tools. Commodities, exchange rate, and interest rate derivatives are covered from the perspective of the hedger, but those interested in arbitrage and speculation are provided some insights as well. Students participate in a simulated trading exercise in which they use price and market information and input from industry experts to manage a hedge position.

AEM 342 Integrated Marketing Communications
Fall. 3 credits. Staff.
This course introduces students to the psychological, sociological, and cultural theories of buyer behavior, with specific attention to consumer information processing and decision making, in the context of the microeconomic theories of demand and cost functions. Students will consider issues such as how to estimate a firm’s demand and cost functions as considered in making such decisions. The course compares standard microeconomic models with more realistic approaches to marketing decisions. The emphasis is on considering decisions that are less stylized and more similar to those managers face on a regular basis.

AEM 344 Consumer Behavior
Fall. 3 credits. Staff.
This course introduces students to the psychological, sociological, and cultural theories of buyer behavior, with specific attention to consumer information processing and decision making, in the context of the microeconomic theories of demand and cost functions. Students will consider issues such as how to estimate a firm’s demand and cost functions as considered in making such decisions. The course compares standard microeconomic models with more realistic approaches to marketing decisions. The emphasis is on considering decisions that are less stylized and more similar to those managers face on a regular basis.
projects are used to illustrate behavioral concepts and their application to marketing practice. The role of research in understanding and explaining consumer behavior is emphasized.

**AEM 346 Dairy Markets and Policy**
Spring. 2 credits. Limited to juniors, seniors, and graduate students.
Prerequisites: ECON 101 or equivalent. S-U grades optional. A. Novakovic.
A survey of topics related to the structure and performance of U.S. dairy markets and federal and state policies that regulate market activities. Emphasis will be placed on learning both the origin and characteristics of dairy policies and methods for analyzing their impacts on market performance.

**AEM 380 Independent Honors Research in Social Science**
Fall or spring. 1-6 credits. Limited to students who have met the requirements for the honors program. See "Honors Program" in CALS section of this catalog. Provides qualified students an opportunity to conduct original research under supervision. Information available in AEM Undergrad Program Office in Warren Hall.

**AEM 403 Farm Management Study Trip**
Spring. 1 credit. Prerequisite: AEM 302. Open by application only.
W. A. Knoblauch.
This is a 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. A paper, selected by the student, which further explores an aspect of the trip, is a requirement for completing the course.

**AEM 404 Advanced Agricultural Finance Seminar**
Spring. 3 credits. Limited to 16 seniors with extensive course work in farm management and farm finance. Open by application prior to March 1 of the year before the course is offered. Staff.
A 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 term, 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 term.

**AEM 405 Agricultural Finance**
Spring. 4 credits. Prerequisite: AEM 302 or equivalent. Staff.
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 410 Business Statistics**
Fall. 3 credits. Prerequisite: AEM 210 or equivalent. C. van Es.
This course focuses on four major topics used to analyze data from marketing research, business, and economics. Topics studied are experimental design and ANOVA, contingency-table analysis, quality-control methods, time-series analysis and forecasting. Brief introductions to non-parametric methods and multivariate analysis are also included. The course will involve a research project designed by the student in collecting and interpreting data.

**AEM 411 Introduction to Econometrics**
Fall. 3 credits. Prerequisite: AEM 210 and either ECON 313 or PAM 200, or equivalents. D. Just.
The course introduces students to basic econometric principles and the use of statistical procedures in empirical studies of economic models. Assumptions, properties, and problems encountered in the use of multiple regression are discussed, and simultaneous equation models, simulation, and forecasting techniques are introduced.

**AEM 412 Introduction to Mathematical Programming**
Spring. 3 credits. Primarily for juniors, seniors, and M.S. degree candidates. Prerequisite: AEM 210 or equivalent. C. Gomes.
This is a course in applied mathematical programming. Emphasis is on formulation of and interpretation of solutions to mathematical models of problems in economics and business. Blending, resource allocation, capital budgeting, transportation and financial planning, and inventory management are studied. Integer and nonlinear programming are introduced.

**AEM 414 Behavioral Economics and Managerial Decisions**
Spring. 3 credits. Prerequisites: ECON 313 or PAM 200. Limited to juniors and seniors. Payment of $40 lab fee required. D. Just.
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 415 Price Analysis (also ECON 415)**
Fall. 3 credits. Prerequisite: AEM 210 or equivalent. ECON 313 or PAM 200 or equivalent. H. M. Kaiser.
The focus of this course is on the analysis of supply and demand characteristics of commodities with particular attention to agricultural products. Special attention is paid to empirical analysis. Institutional aspects of pricing, temporal and spatial price relationships, price forecasting, and the economic consequences of pricing decisions are included.

**AEM 416 Consumer Demographics and Market Dynamics (also D SOC 331)**
Summer. 3 credits. Prerequisite: AEM 210 or equivalent. W. Brown.
For description, see D SOC 331.

**AEM 417 Decision Models for Small and Large Businesses**
Fall. 3 credits. Limited to juniors and seniors. Preference given to AEM majors.
Prerequisites: AEM 210 or equivalent. In weeks labs will be no Friday lecture: C. L. van Es.
The course focuses on economic and statistical models of decision analysis and their applications in large and small business settings. The course demonstrates how use of models can improve the decision-making process by helping the decision maker: understand the structure of the decision, incorporate subjective probabilities as a way to carry risk, measure outcomes in a way that is consistent with attitudes toward risk, and understand the value of information. The importance of sensitivity analysis is emphasized, as is the need to combine both quantitative and qualitative considerations in decision making. Cases are drawn from small business scenarios, the public policy arena, and corporate settings. Implementing decision models with computers is the focus of lab sessions.

**AEM 419 Strategic Thinking**
Fall. 3 credits. Prerequisite: immediate microeconomics (PAM 200 or ECON 313). S-U grades optional. N. H. Chau.
The art of thinking strategically puts outgoing your adversary at the core of your decision-making process, while anticipating that your adversary is doing exactly the same thing. Businesses make investment decisions and innovate products in anticipation of the reaction of their rivals; managers make pay contingent on peer performance, taking into account the reaction of their subordinates and superiors; national trade policies are formulated based on whether trading partners are committed to make credible concessions. How often is your decision to pay attention in class based on whether or not someone else is paying attention? 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 420 Investments**
Fall. 3 credits. Prerequisites: AEM 210 or equivalent and AEM 324. Recommended: ECON 313 and a calculus course. Preference given to students in AEM. S-U grades optional. A. Wang.
This course covers theories and empirical data in the field of financial investments. Descriptions of financial institutions, markets, and instruments are also covered. Topics include: equilibrium models of security prices (CAPM, APT), fixed-income markets, performance evaluation, efficient market hypothesis, and behavioral finance. A portion of this course involves the use of a spreadsheet or other computer programs.
AEM 421 Derivatives and Risk Management  
Fall. 3 credits. Prerequisites: AEM 210 and AEM 324 or equivalents. Recommended: ECON 313 or equivalent and a calculus course. To AEM majors and other students in AEM. S-U grades optional. H. Daouk.  
This course covers the pricing of derivatives and how derivatives can be used for the purpose of risk management and speculation. While no prior knowledge of futures and options is necessary, familiarity with calculus and probability and statistics will be helpful. A portion of this course involves the use of a spreadsheet or other computer programs.

AEM 422 Estate Planning (also NBA 562)  
Fall. 1 credit. Limited to juniors, seniors, and graduate students.  S-U grades only.  D. A. Grossman.  
Fourteen sessions on the various aspects of estate-planning techniques. The law and use of trusts, the law of wills, federal and New York State estate and gift taxes, and substitutes for probate procedures are covered.

AEM 424 Management Strategy  
Fall and spring. 3 credits. Limited to AEM seniors in Business. Fall, G. Blalock; spring, D. Simon.  
This is a capstone course designed to integrate what students have learned in other AEM courses with an emphasis on strategic decision making. Issues are approached from the standpoint of the board of directors, chief executive officer, and business unit managers. What should be considered and how strategic decisions should be made are the focus of the course.

AEM 425 Small Business Management Workshop  
Fall. 4 credits. Limited to seniors.  Prerequisite: AEM 325 or NBA 300 and permission of instructor.  Term project work costs will amount to approximately $100 per team.  D. Streeter.  
Students serve as counselors to small businesses in the central New York area and confront problems facing small personal enterprises. Encourages the application of business principles and the business management of existing businesses and the witnessing of the results of firm-level decision making. Student teams meet with the business owners and course staff members at arranged times during the semester.

AEM 427 Agribusiness Strategy  
Fall. 3 credits. Prerequisites: AEM 220 or AEM 502. B. A. Gloy.  
The course is intended for students with an interest in agribusiness and is designed to integrate previous course work and enhance problem identification and solving skills. The focus is on the evaluation, formulation, and implementation of strategy designed to create and sustain competitive advantage for agribusiness firms. The course covers industry analysis, firm analysis, market analysis and selection, risk analysis, strategy development, and organization, and leadership for agribusiness firms. This course is designed as a capstone course for the agribusiness management specialization.

AEM 428 Valuation of Capital Investment  
Spring. 3 credits. Prerequisites: AEM 210 and AEM 324 or equivalents. D. T.-C. Ng.  
This course is about 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. Various valuation models are examined in detail and applied 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, pro forma analysis for strategy and planning, analysis of risk, and the determination of price-earnings and market-to-book ratios.

AEM 429 International Finance  
Spring. 3 credits. Prerequisites: AEM 210 and AEM 324. S-U grades optional. D. T.-C. Ng.  
The purpose of this course is to learn about issues in international financial management and international investment. The major issues that are discussed include exchange rate volatility, the benefit of international diversification, and the analysis of international capital budgeting decisions. Specific topics include the determination of the cost of capital for foreign investments, the determination and management of foreign exchange risks and country risks, and the use of innovative financing for the multinational corporation.

AEM 430 International Trade Policy  
Spring. 3 credits. Prerequisites: ECON 101–102 or equivalents and intermediate microeconomics. Recommended: AEM 230. Optional section TBA. N. H. Chau.  
This course examines the economic principles underlying international trade and monetary policy, and the policies, practices, and institutions that influence trade and foreign exchange markets. Applications to current topics in international trade policy, to trade in primary commodities, and to both developed and developing countries are also emphasized.

AEM 431 Agricultural and Food Policy  
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Prerequisites: PAM 200, ECON 313, or equivalent. S-U grades optional. A. Novakovski.  
This course will acquaint 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. Methods of policy analysis will be explored, and students will learn to critique policies and write policy briefs.

AEM 432 Business and Governments in a Global Marketplace  
Fall. 3 credits. Prerequisite: AEM 240 or equivalents. S-U grades optional. S. P. Raj.  
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, and 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 433 Devolution, Privatization, and the New Public Management (also CRP 412 and FGSS 411)  
Fall. 4 credits. Prerequisite: ECON 101. S-U grades optional. M. E. Warner.  
For description, see CRP 412.

AEM 434 Government Policy Workshop (also CRP 418 and FGSS 420)  
Spring. 4 credits. S-U grades optional. M. E. Warner.  
For description, see CRP 418.

AEM 442 Emerging Markets  
Fall. 3 credits. Prerequisites: AEM 240 and PAM 200 or ECON 313. Limited to seniors and graduate students. R. D. Christy.  
This course provides a basic 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. The risk of entering markets in low-income economies is appraised and assessment of the political, legal, cultural, and economic forces is conducted. Case studies of companies are analyzed and discussed.

AEM 443 Food-Industry Strategy  
Fall. 3 credits. Restricted to AEM juniors, seniors, and grad students. Others by permission of instructor. Prerequisite: AEM 240 or 448 or permission of instructor. J. M. Hagen.  
A case-study approach is used to examine the application of management principles and concepts to marketing and distribution problems of the food industry. Cases covering new product introductions, merchandising strategies, and investment decisions are included. Guest speakers from the food industry present case-study solutions at the Tuesday afternoon session.

AEM 444 Marketing Strategy and Brand Management  
Fall. 3 credits. Prerequisite: AEM 240. S. P. Raj.  
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, and 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.
weekly focus for the Food Marketing Fellows Program. The seminar covers advanced topics in food marketing, many of which have an important international dimension and are presented by industry members. A number of field trips are taken. Students participate in research topics on various aspects of the food industry.

AEM 447 Food Marketing Colloquium
Spring. 1 credit. Limited to food marketing fellows. D. J. Perosio.
AEM 446 and 447 have been developed as a two-semester special seminar that provides the weekly focus for the Food Marketing Fellows Program. The seminar covers advanced topics in food marketing, many of which have an important international dimension and are presented by industry members. A number of field trips are taken. Students participate in research topics on various aspects of the food industry.

AEM 448 Food Merchandising
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: AEM 240. D. J. Perosio.
Covers merchandising principles and practices as they apply to food industry situations. The various elements of merchandising such as buying, pricing, advertising, promotion, display, store layout, profit planning and control, and merchandising strategy are examined. The consequences of food industry trends and initiatives for other industry members, public policymakers, and consumers are considered.

AEM 449 Global Marketing Strategy
Spring. 3 credits. Prerequisite: a previous marketing course. Limited to juniors, seniors, and graduate students. J. M. Hagen.
This course 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. The course includes case analysis and discussion.

AEM 450 Resource Economics (also ECON 450)
Fall. 3 credits. Prerequisites: MATH 111, ECON 313, and a familiarity with EXCEL. J. M. Conrad.
Dynamic models of renewable, nonrenewable, and environmental resources are constructed to examine market allocation and optimal resource management.

AEM 451 Environmental Economics (also ECON 409)
Spring. 3 credits. Prerequisites: ECON 313, or intermediate microeconomics course, and calculus. Limited to undergraduate students. S-U grades optional. G. L. Poe.
This course explores the economic foundations for public decision making about environmental commodities and natural resources, using tools from intermediate microeconomics. Emphasis is placed on the welfare economic approach for allocating public goods, with specific emphasis on market failure, internalities, benefit-cost analysis, and the use of nonmarket valuation techniques. Property rights/institutional perspectives and ecological economic concepts are also examined.

AEM 464 Economics of Agricultural Development (also ECON 464)
Fall. 3 credits. Prerequisites: ECON 101-102, or permission of instructor. R. D. Cline.
This course is designed to provide an understanding of the economics of the agricultural sector in low-income countries. In addition, more detailed issues of economic development beyond the agricultural sector are covered to provide the necessary context for an understanding of rural problems. Among the areas covered are the nature of development and technical change, welfare and income distribution, land reform, food and nutrition policy, food security and food aid, competition with more developed countries and international markets, the effect of U.S. policy on agricultural development, and the role of international institutions. Examples from a wide variety of developing countries are used to illustrate the basis for economic analysis.

AEM 494 Undergraduate Special Topics in Applied Economics and Management
Fall or spring. Variable credit. S-U grades optional. 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 497 Individual Study in Applied Economics and Management
Fall or spring. Variable credit. S-U grades optional. Students must register with an Independent Study form (available in the Undergraduate Program Office in Warren Hall). Staff.
Use for special projects designed by faculty members.

AEM 498 Supervised Teaching Experience
Fall or spring. 1-4 credits. Total of 4 credits maximum. S-U grades optional. 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 555 Environmental Management and Policy
Fall. 3 credits. Prerequisites: ECON 101 and 102 or equivalent and calculus. L. D. Chapman.
The seminar is an inside look at implementation and evaluation of environmental policy in a business or organization. We will examine the effectiveness of the new market-based regulatory changes and the operational significance of sustainability in a business context and come to understand the economic basis for government's role in environmental protection. HBS case studies are used, and each seminar participant prepares a case study of environmental management in a business or organization. Extensive use is made of guest speakers from finance, electricity, forest products, construction, and manufacturing.

AEM 605 Agricultural Finance
Fall. 3 credits. Prerequisite: AEM 324 or 405 or equivalent. Not offered fall 2005. B. A. Gloy.
Advanced topics in agricultural finance. Topics include investment analysis, capital budgeting under uncertainty, decision analysis, risk management, capital structure, and financial intermediaries.

AEM 608 Production Economics (also ECON 408)
Fall. 3 credits. Prerequisite: ECON 313 and MATH 111 or equivalents. L. W. Tauer.
The theory of production economics with emphasis on applications to agriculture and natural resources is studied. Topics include the derivation, estimation, and use of production, cost, profit, revenue, demand, and supply functions. The concepts of efficiency and productivity are discussed. Production response over time and under risk is introduced.

AEM 611 Global Modeling
Spring. 3 credits. Prerequisite: a course in graduate micro theory. T. D. Mount, R. N. Boisvert.
This course is taught over the Internet by Tom Hertel at Purdue University. It is designed to teach people how to use a global general equilibrium model (GTAP) for research on trade and environment policies. Weekly assignments start with the components of a single-country model and end with a full global model. A final project and the assignments are the primary course requirements.

AEM 612 Applied Econometrics
Fall. 1 credit. Prerequisite: concurrent enrollment in AEM 608, or permission of instructor. Designed for M.S. and Ph.D. students who do not meet the prerequisites for other graduate-level econometrics courses. AEM 612 complements AEM 411, providing greater depth of understanding of econometric methods and exposure to applied econometric literature. Course work focuses on preparing students to conduct their own applied econometric research.

AEM 630 Policy Analysis: Welfare Theory, Agriculture, and Trade (also ECON 430)
Spring. 4 credits. Prerequisites: AEM 608 or PAM 603, ECON 313, or equivalent intermediate micro theory 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 versus nonmarket allocation. Basic concepts covered include measurement of welfare change, including the compensation principle, consumer surplus, and producer surplus, willingness-to-pay
measures, externalities, and the general theory of second-best optima. The second half of the course 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 632 Open Economy Analysis: Theory and Applications**
Spring. 3 credits. Prerequisites: ECON 313 and ECON 314. S-U grades optional.
N. Chau and S. Kyle.
This course explores both recent theoretical and methodological advances as well as practical applications in analyzing current topics and issues in open economies. It 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 633 Devolution, Privatization, and the New Public Management (also CRP 612 and FGSS 611)**
Fall. 4 credits. S-U grades optional.
M. E. Warner.
For description, see CRP 612.

**AEM 634 Government Policy Workshop (also CRP 618 and FGSS 620)**
Spring. 4 credits. S-U grades optional.
M. E. Warner.
For description, see CRP 618.

**AEM 640 Analysis of Agricultural Markets (also ECON 440)**
Fall. 3 credits. Prerequisites: AEM 411 and 415 or equivalents. H. M. Kaiser.
This course focuses on the unique features of agricultural commodity markets. Focus is placed on government and private institutions impacting these markets, as well as on models of price behavior including marketing margins and imperfect competition. Empirical tools to evaluate market characteristics are also covered.

**AEM 641 Commodity Futures Markets (also ECON 441)**
Spring. weeks 8-14. 2 credits.
Prerequisites: AEM 411 and 415 or equivalents. Recommended: AEM 640.
W. G. Tomek.
This course is about markets for agricultural futures contracts. Emphasis is placed on models of price behavior on futures markets including long and short positions among cash and futures prices. These principles provide a foundation for a discussion of hedging, speculation, and public-policy issues.

**AEM 651 Environmental and Resource Economics**
Spring. 4 credits. Limited to graduate students. W. T. Parziale.
A review of welfare economics, environmental externalities, and common property resources, and a survey of current environmental and natural resource policy. Techniques for measuring benefits and costs—including property value and wage hedonic approaches, travel cost models, and contingent valuation—are covered. Survey/data collection methods are described in detail. Innovative market mechanisms for resolving public good, common property, and externality problems are explored. Students are required to complete a paper describing their own formal economic analysis of a natural resource or environmental problem. Open to graduate students outside of economics. AEM 651 is a core course for the Environmental Management concentration option.

**AEM 652 Land Economics Problems**
Fall or spring. 1 or more credits. Limited to graduate students. Prerequisite: permission of instructor. S-U grades optional. Staff. Special work on any subject in the field of land and resource economics.

**AEM 655 Electric Systems Engineering and Economics (also ECE 551)**
Fall. 2 credits. Prerequisites: basic calculus and microeconomics. T. D. Mount and R. Thomas.
For description, see ECE 551.

**AEM 660 Agroecosystems, Economic Development, and the Environment**
Spring. 3-4 credits. Limited to graduate students. An additional section will be arranged for economics majors. S-U grades optional. D. R. Lee.
This course examines selected topics in agricultural and economic development, technology assessment, ecosystem management and the environment, with a focus on developing countries. Topics covered 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. This course opens to graduate students outside of economics.

**AEM 667 Topics in Economic Development (also ECON 770)**
Fall. 3 credits. Prerequisite: basic first-year courses in ECON or AEM, or instructor's permission. S-U grades optional.
R. Kanbur.
This course is targeted to second-year graduate students. Topics covered vary from year to year but may include: poverty, inequality, intra-household allocation, structural adjustment, and debt. Examination is by term paper.

**AEM 670 Economics of Consumer Demand (also PAM 608)**
Fall. 3 credits. Prerequisites: ECON 311 or 315 and 2 semesters of calculus. S-U grades optional. C. K. Ramney.
A graduate level introduction to theory and empirical research on household demand, consumption, and saving. Emphasis is on the use of the theory in empirical research. Topics include neo-classical theory of demand, duality, complete demand systems, conditional demand, demographic scaling and translating, consumption, and savings. As time allows, Becker and Lancaster models of demand may be introduced.

**AEM 694 Graduate Special Topics in Applied Economics and Management**
Fall or spring. 4 credits maximum. S-U grades optional. 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 698 Supervised Graduate Teaching Experience**
Fall or spring. 1-4 credits. Total of 4 credits maximum during graduate program. Students must register using an Independent Study form (available in the Undergraduate Program Office in Warren Hall). Open only to graduate students. Undergraduates should enroll in AEM 498. Prerequisite: permission of instructor. S-U grades optional. 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 cannot receive both pay and credit for the same hours of preparation and teaching.

**AEM 699 M.P.S. Research**
1-6 credits. Prerequisite: registration as an M.P.S. student. Credit is granted for the M.P.S. project report. Staff.

**AEM 700 Individual Study in Applied Economics and Management**
Fall or spring. Limited to graduate students. S-U grades optional. Credit, class hours, and other details arranged with a faculty member. Staff.
This course is used for special projects designed by faculty members. More than one topic may be given each semester in different sections. The student must register in the section appropriate to the topic being covered; the section number is provided by the instructor.

**AEM 708 Advanced Production Economics**
Fall. 3 credits. Prerequisite: AEM 408, 710, or equivalents; ECON 609 is highly recommended. Offered alternate years. Not offered 2004-2005. R. N. Boisvert.
Covers theoretical and mathematical developments in production economics, with emphasis on estimating production relationships, scale economies, technical change, and factor substitution. Developments in flexible functional forms, duality, and dynamic adjustment models are emphasized. Considerable emphasis is given to empirical specification and estimation. Discussions of other topics (risk, supply response, and household production functions) based on student interest.

**AEM 710 Econometrics I**
Spring. 3 credits. Prerequisites: matrix algebra and statistical methods at the level of ILRST 311 or ECON 619. H. Daouk.
This course, together with AEM 711, provides 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.
This course examines selected topics in the professional literature on international trade policy, focusing on agricultural trade and related topics, internationalization, trade and environmental linkages, technological change and trade policy, and agricultural trade and development.

AEM 735 Public Finance: Resource Allocation and Fiscal Policy (also ECON 735)
Fall. 4 credits. R. Karbuz.
For description, see ECON 735.

AEM 740 Agricultural Markets and Public Policy
Spring, weeks 1-7. 2 credits. Limited to graduate students. Prerequisites: familiarity with multiple regression techniques at the AEM 411 level or higher. Recommended: AEM 640. W. H. Lessar.
Develops the concepts and methodology for applying and analyzing the effects of public-policy directives to the improvement of performance in the U.S. food marketing system. Prospective topics include a survey of industrial organization principles, antitrust and other legal controls, and coordination systems in agriculture. Topics may be adjusted to students' interests.

AEM 750 Resource Economics
Fall. 3 credits. Prerequisites: ECON 609 and 618, or AEM 713. S-U grades optional.
R. N. Boisvert.
This course is concerned with the solution of dynamic allocation problems. Course 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 758A Agricultural Economics
Fall. 4 credits. Prerequisite: ECON 609. S-U only. J. M. Conrad.
A comprehensive treatment of linear programming and its extensions, including postoptimality analysis. Topics in nonlinear programming, including separable, spatial equilibrium, and risk programming models. Input-output models and their role in social accounting matrices and computable general equilibrium models are discussed. Applications are made to agricultural, resource, and regional economic problems.

AEM 714 Experimental Economics
Fall. 4 credits. Prerequisite: ECON 609.
Offered in alternate years. W. D. Schulze.
The course will survey both experimental economics methods and research as an approach to test economic theory. Students will participate as subjects in a series of illustrative computerized experiments ranging from double auctions to public goods. Topics covered 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 713 Dynamic Optimization
Spring. 3 credits. Prerequisite: ECON 609. S-U only. J. M. Conrad.
This course is concerned with the solution of dynamic allocation problems. Course 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 717 Research Methods in Agricultural Economics
Spring. 2 credits. Limited to graduate students. R. N. Boisvert.
Discussion of 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 730 Seminar on International Trade Policy: Agriculture, Resources and Development
Spring. 3 credits. Limited to graduate students. Prerequisites: AEM 630 or equivalent. Not offered spring 2005. D. R. Lee.
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 and Japanese quail. Laboratory exercises include animal handling and examining aspects of growth and development. Living farm animals are used noninvasively, and fresh organs from dead animals are examined.

AN SC 105 Contemporary Perspectives of Animal Science
A forum to discuss the students' career planning and the contemporary and future role of animals in relation to human needs.

AN SC 110 Animals and the People Who Live with Them: Lecture
Students completing this course understand the importance of the symbiosis between humans and domestic animals, and learn how animal enterprises can be ethically, environmentally, and economically sound.

AN SC 111 Animals and the People Who Live with Them: Lab
Students completing this course are able to restrain and care for several species of domestic animals, including cats, dogs, sheep, cattle, goats, fish, and horses. Other species may be added according to student interest. Associated with AN SC 110, but may be taken separately.

AN SC 150 Domestic Animal Biology II
Spring. 4 credits. S-U grades optional. Lecs, M W F 9:05; lab/disc T W or R 2:00–4:25. W. R. Butler and staff.
Second of a two-semester sequence (100/150), applying the basic biology of growth, defense mechanisms, reproduction, and lactation to aspects of the production and care of domestic animals. Fresh tissues and organs from dead animals along with preserved specimens are used in laboratories, exercises, and demonstrations. A quail colony will be used for growth exercises and data collection.

AN SC 212 Animal Nutrition
Fall. 4 credits. Prerequisite: CHEM 208 or equivalent. Recommended: AN SC 100 and 150. Lecs, M W F 10:10; lab, M W T R or F 1:25–4:25. A. W. Bell and D. J. R. Cherney.
An 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.

AN SC 213 Nutrition of the Dog
Nutrition of the dog. Digestive physiology, nutrient requirements, feeding practices, and interactions of nutrition and disease.

AN SC 214 Nutrition of Exotic Animals
Principles of nutrition for exotic animals. Nutrient requirements, sources of nutrients, feeding management systems, and ration formulation are discussed. Signs of nutrient deficiencies and excesses are described.

AN SC 215 Exotic Avian Husbandry and Propagation
Fall. 2 credits. Limited to 100 students.
Prerequisites: AN SC 100, 150, or one year of introductory biology. Lecs, M 2:30–4:25. J. Parks and D. Mucarella.
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.

AN SC 216 Nutrition of the Cat
Fall. weeks 1–7. 1 credit. Prerequisite: AN SC 212 or equivalent. Offered alternate years. Not offered fall 2005. Lecs, W 7:30–9:25 P.M. H. F. Hintz.
Nutrition of the cat. Digestive physiology, nutrient requirements, feeding practices, and interactions of nutrition and disease.

AN SC 221 Introductory Animal Genetics
Spring. 3 credits. Prerequisite: a year of college biology. Lecs, T R 9:05; sec, T W R or F 2:00–4:25. E. P. Pollak.
An examination of basic genetic principles and their application to the improvement of domestic animals, with emphasis on the effects of selection on animal populations.

AN SC 222 Introduction to Canine Genetics
Winter or summer. 1 credit. Prerequisites: introductory biology or permission of instructor. S-U grades only. To receive credit, register through the School of Continuing Education. www.sce.cornell.edu/DL/html/caninegenetics.html. F. J. Pollak.
Introduction to basic Mendelian genetics and simply inherited characteristics in the dog. This distance-education course delivered by CD and web interaction for residents and nonresidents consists of lectures on basic genetic principles, probabilities, linkage and genetic testing, and seminars on genome mapping, inherited sexual disorders, bleeding disorders, and eye defects. This course cannot be taken for credit by students who have successfully completed AN SC 221.

AN SC 250 Dairy Cattle Principles
Fall. 3 credits. S-U grades optional. Lecs, T R 10:10; lab, R or F 1:25–4:25. D. M. Galton and T. Batchelder.
Introduction to the background and scientific principles relating to dairy cattle production. Laboratories are designed to provide an understanding of production techniques. This course is a prerequisite for AN SC 251, 351, 354, and 355.

AN SC 251 Dairy Cattle Selection
Fall. 2 credits. Prerequisite: open only to seniors or permission of instructor. S-U grades optional. Lecs, W 11:15–12:05, disc, W 12:20–1:10. D. M. Galton.
Application of scientific principles of genetic programs in herds with different breeding programs. Emphasis is on economical traits to be used to improve genetic progress and herd profitability.

AN SC 265 Horses
Fall. 3 credits. Prerequisites: AN SC 100 and 150 or permission of instructor. S-U grades optional. Lecs, T R 9:05; lab, R 1:25–4:25. C. Collyer.
Selection, management, feeding, breeding, and training of light horses.

AN SC 280 Molecular Biology in Agriculture and Medicine
Fall. 3 credits. Prerequisite: one year of introductory biology. Lec, T R 10:10–11:25. S. M. Quirk.
The applications of molecular biology to animal research, animal agriculture, industry and medicine are discussed. An introduction of basic recombinant DNA techniques is followed by topics such as genome projects, comparative and functional genomics, genetic screening, gene therapy, transgenic animal production, and mammalian cloning. Ethical issues raised by the use of these technologies are explored in class discussions.

AN SC 290 Meat Science (also FD SC 290)
Fall. 2 or 3 credits. Lecs, T R 11:15; lab, M or R 12:20–3:20. Lecture only, 2 credits; lecture plus lab, 3 credits; lab cannot be taken without lecture. D. Shaw.
An introduction to meat science through a study of the structure, composition, and function of muscle and its conversion to meat. Properties of fresh and processed meat, microbiology, preservation, nutritive value, inspection, and sanitation are also studied. 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 commercial meat plant may be taken.

AN SC 300 Animal Reproduction and Development
Spring. 3 credits. Prerequisite: AN SC 100–150 or equivalent and 1 year of introductory biology. Lecs, M W F 10:10. J. E. Parks.
Comparative anatomy and physiology of mammalian and avian reproduction, with emphasis on domestic and laboratory animals. Fertilization through embryonic development, pregnancy, and growth to sexual maturity; emphasis on physiological mechanisms and application to fertility regulation. Separate laboratory offered to demonstrate fundamental aspects of reproduction and reproductive technology.

AN SC 301 Animal Reproduction and Development Lab
Spring. 1 credit. Prerequisite: AN SC 100–150 or equivalent. Concurrent enrollment in or completion of AN SC 300 required to register. Labs, M W or F 1:25–4:25. Each lab limited to 30 students. J. E. Parks.
Demonstration of 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.
AN SC 305 Farm Animal Behavior (also BIOAP 312)
Spring. 2 credits. Prerequisites: one year of introductory biology and introductory animal physiology (AN SC 100 and 150 or equivalent is sufficient or BIOAP 311); at least 1 animal production course or equivalent experience is recommended. S-U grades optional. Lec., T R 11:15. Staff. The behaviors that occur in animals (avian and mammalian) influence the success of any management program. Students study behaviors relating to communication, learning, social interactions, reproduction, and feeding of domestic and non-domestic animals and their physiological basis. Management systems for commercial livestock production and their implications for animal behavior and welfare are stressed.

AN SC 323 Equine Genetics Seminar
Fall. 2 credits. S-U grades only. Prerequisite: AN SC 221 or equivalent. Disc., T 1:25–2:15. P. A. Olfenboum. Topics of equine genetics are presented and discussed. Students are also required to view one seminar each week. These seminars are animated PowerPoint presentations available in computer lab and can be viewed at flexible times during the week.

AN SC 341 Biology of Lactation
Spring. 2 credits. Prerequisites: AN SC 100–150 or Animal Physiology. Offered alternate years; next offered spring 2005, 2007. Not offered spring 2006. Lec., T R 9:05. Y. R. Boisclair and staff. A comprehensive survey of the biology of the mammary gland. Lectures cover: 1) basic aspects such as anatomy and development of the mammary gland, biochemistry and hormone regulation of milk synthesis and regulation of gene expression in the mammary cells; 2) practical aspects such as the impact of lactation on nutrition, reproduction, and diseases. Lactation in the dairy cow provides the primary context to the course; but examples from other mammals, including humans, are used.

AN SC 351 Dairy Herd Management

AN SC 354 Dairy Cattle Health
Fall. 3 credits. Prerequisite: AN SC 250 or permission of instructor. Lecs., T R 9:05–9:55; lab, R 1:25–4:25. D. M. Galton and W. Stone. Application of scientific principles to practical herd management with emphasis on herd health and animal well-being. Laboratory emphasizes practical applications of herd health management including on-farm herd health analysis.

AN SC 355 Dairy Cattle Nutrition
Spring. 3 credits. Prerequisite: AN SC 250 or permission of instructor. Letter grade only. Lecs., M W 10:10. T. L. Batchelder and J. E. Chase. Application of scientific principles to practical herd nutrition relating to herd production and feeding management. Laboratory emphasizes practical applications and field trips.

AN SC 360 Beef Cattle

AN SC 365 Equine Nutrition
Fall. 3 credits. Prerequisites: AN SC 100, 212, and 265 or equivalent. S-U grades optional. Lesc., M W F 9:05–9:55. H. F. Hintz. The principles of nutrition for horses are presented. Digestive physiology, sources of nutrients, feeding programs for various classes of horses and interactions of nutrition and diseases are discussed.

AN SC 370 Swine Nutrition and Management
Fall. 3 credits. Recommended: AN SC 212. Lec., T R 11:15; lab, T 2:00–4:25. Offered alternate years. Next offered fall 2004; not offered fall 2005. X. G. Lei and K. Roneker. This course focuses on swine nutrition, feeding, and management. Lectures are integrated basic nutrition and swine system including pig biology, digestive and metabolic development, nutritional biochemistry, and physiology of impact of swine nutrition on environment, use of pig model in medicine, and current swine nutrition and biotechnology. Laboratory practice, animal projects, and problem troubleshooting are offered.

AN SC 380 Sheep
Spring. 3 credits. Lec., T R 10:10; sec, W 2:00–4:25. Offered alternate years. Next offered spring 2005, 2007; not offered spring 2006. M. L. Thomey. Emphasis is on the breeding, feeding, and management of sheep from a production-system approach. Lectures and laboratories are designed to give students a practical knowledge of sheep production as well as the scientific background for improved management practices. Students work directly with sheep during laboratories and spend several days during the semester feeding and caring for ewes and their newborn lambs.

[AN SC 400 Livestock in Tropical Farming Systems]

AN SC 401 Dairy Production Seminar
Spring. 1 credit. Limited to juniors and seniors. Disc., M 7:30 P.M. T. R. Overton. Capstone course where 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.

AN SC 402 Seminar in Animal Sciences
Spring. 1 credit. Limited to students engaged in undergraduate honors research projects. S-U grades optional. Disc., M 4:30. S. Quirk. Reports of undergraduate research and honors projects. Students present oral reports of their work for class discussion.

[AN SC 403 Tropical Forages]
Spring. 2 credits. Limited to seniors and graduate students except by permission of instructor. Prerequisites: crop production and livestock nutrition. Offered alternate years. Next offered spring 2006; not offered spring 2005, 2007. Lees, T 10:10. A. N. Pel. An overview of tropical grasslands, seeded pastures, and crop residues as feed resources; grass and legume characteristics; establishment and management of pastures; determination of feeding value of forages and crop residues; physiology of digestion of ruminants that affects feeding behavior; problems of chemical inhibitors in plants; and preservation of tropical forages as hay or silage.

AN SC 410 Nutritional Physiology and Metabolism
Fall. 3 credits. Prerequisites: biochemistry and physiology. M. W. 11:15. R. E. Austin and D. E. Haun.
A fundamental approach to nutrition focusing on the metabolic fate of nutrients and the interrelationships among nutrients, nutritional state, and metabolic processes. The overall goal is to increase understanding of metabolism and metabolic regulation through an integration of nutrition, biochemistry, and physiology.

AN SC 411 Applied Cattle Nutrition
Fall. 4 credits. Prerequisites: AN SC 100 and 212 (or equivalent); AN SC 355 is strongly encouraged. Lecs., M W F 10:10. Lab., M 1:25–4:25. M. E. Van Amburgh. An applied approach to predicting nutrient requirements and feed utilization to meet requirements with wide variations in cattle type, feed composition, and environmental conditions. Dairy cattle are emphasized. Nutrient management to minimize cost of production and environmental effects is discussed. Computer models (Cornell Net Carbohydrate and Protein System) are used in the laboratory to apply the information presented in lectures, including evaluation of feeding programs on case study farms. Course is designed for juniors, seniors, and entering graduate students.

AN SC 412 Whole Farm Nutrient Management (also CSS 412)
Spring. 2 or 4 credit option. Open to juniors, seniors, and graduate students only. Course offered as two modules. Enrollment in Module 1 for the first half of the semester is required (2 credits). Module 1 consists of the crop and manure nutrient management planning; no prerequisites for CALS students. Enrollment in Module 2 for the second half of the semester is optional (additional 2 credits). This module builds on the crop and manure nutrient management planning module by integrating agronomic nutrient management planning with herd nutrient management planning. AN SC 411
This course provides students with an understanding of the concepts underlying whole farm nutrient management planning to improve profitability while protecting the environment. Students learn and apply concepts in the development of a Comprehensive Nutrient Management Plan (CNMP) that is required for a Concentrated Animal Feeding Operation plan to meet environmental regulations. Students develop components of a CNMP 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. Students opting to continue through the end of the semester in Module 2 (4 credit option) build upon knowledge gained in the first half of the semester by using the knowledge and skills necessary to integrate crop production and herd feeding management for reducing nutrient imports on farms.

AN SC 413 Contemporary Issues in Animal Science
Spring. 1 credit. Open to juniors, seniors, and graduate students only. Lect and disc. M 12:20; disc, W 12:20-1:10; D. J. R. Cherney. Exploration of the place of humans in the biological world, origins of ethics and morality, specieism, the use of animals for research and agricultural purposes, transgenic animals. A book review, participation in discussion in class and on-line, and a project of the student's choice used to evaluate the performance of each student.

AN SC 420 Quantitative Animal Genetics
Spring. 2 credits. S-U grades only. Prerequisites: AN SC 221 or equivalent. Limited to 30 students. Lect, M 12:20; sec, M 2:00-4:25; F. J. Pollak. A consideration of problems involved in improvement of animals through application of the theory of quantitative genetics, with emphasis on genetic evaluation and analysis of data for genetic parameters. Computer labs use interactive matrix algebra programs for problem solving.

AN SC 425 Gamete Physiology and Fertilization (also BIOAP 425)
Fall. 2 credits. Limited to 50 students. Prerequisite: AN SC 300 or equivalent. Offered alternate years. Next offered fall 2005; not offered fall 2004, 2006. Lect, R 2:50-3:45; F. E. Parks. Study of the formation, growth, differentiation, and maturation of mammalian sperm and oocytes; gamete transport and interaction with male and female reproductive tracts; and cytological, physiological, and molecular changes required for fertilization. Lecture, discussion, and aspects of gamete physiology and in vitro technologies such as cryopreservation, oocyte maturation, and fertilization are covered.

AN SC 427 Fundamentals of Endocrinology (also BIOAP 427)
Fall. 3 credits. Prerequisite: animal or human physiology or permission of instructor. Lect, M W F 9:05; P. A. Johnson. Physiology and regulation of endocrine secretions. Neuroendocrine, reproductive, growth, and metabolic aspects of endocrinology are emphasized. Examples are selected from many animals, including humans.

AN SC 451 Dairy Herd Business Management
Fall. 3 credits. Prerequisite: enrollment in AN SC 456. Lect, W 1:25-2:15; disc, W 2:30-3:20; lab, F 1:25-4:25; D. M. Galton. Emphasis on dairy herd business management with application to herd management analysis. Laboratory includes farm tours and analysis.

AN SC 456 Dairy Management Fellowship
Spring. 2 credits. Limited to seniors. Prerequisites: AN SC 351 and permission of instructor. S-U grades only. Hours TBA; D. M. Galton. The program is 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.

AN SC 494 Special Topics in Animal Science
Fall or spring. 4 credits maximum. Prerequisite: undergraduate standing. S-U grades optional. Staff. The department teaches the "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.

AN SC 496 Internship in Animal Science
Fall or spring. 1-3 credits; limited to 6 credits maximum during undergraduate career. Students must register using an Independent Study form (available in 140 Roberts Hall). S-U grades only. Limited to 30 students. 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 adviser. The internship should provide a supervised experience with at least 60 hours on the job per credit required.

AN SC 497 Individual Study in Animal Science
Fall or spring. 1-3 credits; may be repeated for credit. Intended for individual study in animal sciences. Prerequisite: permission of instructor. Students must register using an Independent Study form (available in 140 Roberts Hall). S-U grades optional. Staff. May include individual tutorial study or a lecture topic selected by a professor. Since topics may change, the course may be repeated for credit.

AN SC 498 Undergraduate Teaching
Fall or spring. 1, 2, or 3 credits, limited to 2 experiences during undergraduate career. Limited to students with a GPA of at least 2.7. Students must register using an 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 the student's 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.

AN SC 499 Undergraduate Research
Fall or spring. 6 credits maximum during undergraduate career. Not open to students who have earned 6 or more undergraduate research credits elsewhere in the college. Limited to juniors and seniors with a GPA of at least 2.7. Students must register using an 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.

AN SC 603 Mineral Nutrition: Metabolic, Health, and Environmental Aspects (also NS 603)
Fall. 3 credits. Limited to graduate students only. Prerequisites: biochemistry, physiology, and nutrition. T 2:00-4:00. Offered alternate years. Next offered fall 2004, 2006; not offered fall 2005. X. G. Lei and C. C. McCormick. An advanced course that emphasizes metabolism, mineral regulation, oxidation, 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. Effective approaches to improve global mineral nutrition by agriculture and food systems are discussed.

AN SC 606 Ruminant Nutrition: Microbial Ecology and Forage Chemistry
Spring. 4 credits. Prerequisites: AN SC 212, Biochemistry. S-U grades only. Lect, M W F 9:05; disc, W 8:00. Offered alternate years. Next offered spring 2005, 2007; not offered 2006. A. N. Penner. This course provides an overview of ruminant nutrition with an emphasis on microbial ecology, forage chemistry, and rumen function.

AN SC 610 Animal Science Seminar
Fall and spring. 1 credit. Registration limited to graduate students. S-U grades only. Lect T 12:20-1:10; D. J. R. Cherney.
Students attend a weekly seminar on topics related to animal science. The requirement for an S grade is to regularly attend seminars during the semester.

**AN SC 619 Field of Nutrition Seminar (also NS 619)**
Fall and spring. No credit. No grades given.
For description, see NS 619.

**AN SC 620 Seminar in Animal Breeding**
Fall and spring. 1 credit. Limited to graduate students with a major or minor in animal breeding. S-U grades only. Hours TBA. E. J. Pollak.
Seminar on current topics in animal breeding and statistics as applied to genetic evaluation and selection of domestic animals.

**AN SC 621 Reproductive Physiology/Endocrinology Seminar**
Fall and spring. 1 credit. Prerequisites: permission of instructor. Registration limited to graduate students. S-U grades only. Lec, W 4:00; W. R. Butler and staff.
Current research in reproductive physiology is presented by staff members, graduate students, and visitors.

**AN SC 625 Nutritional Toxicology (also TOX 625)**
Spring. 2 credits. Prerequisites: biochemistry and nutrition courses. S-U grades optional. Offered alternate years.
Exploration of toxicological principles and a selective survey of natural food and feed toxicants. At the end of this course, students understand relationships between nutrition and toxicology, are prepared to conduct research concerning the effects of naturally occurring toxicants; and are able to use multimedia to present their understanding of a class of toxicants. Occasionally, the class takes walking field trips. In addition, students read printed and electronic communications and create STELLA simulation models and a system of web pages related to a specific family of toxicants.

**AN SC 640 Individual Study in Animal Science**
Fall or spring. 1 or more credits. S-U grades optional. Staff.
Study of topics in animal science more advanced than, or different from, other courses. Subject matter depends on interests of students and availability of staff.

**AN SC 650 Molecular Techniques for Animal Biologists**
Spring. 2 credits. Prerequisites: BIOBM 330 or BIOBM 332 or BIOBM 333 or equivalents and permission of instructors. Enrollment limited to 15 students. Offered alternate years. Next offered spring 2006; not offered spring 2005, 2007. Lec, T 11:15; labs, T and R 1:25-4:25. Y. Boisclair and staff.
A laboratory course designed for students who have little or no experience with techniques in molecular biology. Emphasis is on modern techniques used in conducting research in animal-related sciences such as nutrition, physiology, pharmacology, and immunology (e.g., subcloning, mutagenesis of DNA, RT-PCR analysis of gene and protein expression, overexpression of proteins, and study of protein-DNA interactions). Lectures introduce laboratory exercises and supplement laboratory topics. Students perform an independent project requiring time outside scheduled laboratories and give a scientific presentation.

**AN SC 694 Special Topics in Animal Science**
Fall or spring. 4 credits maximum.
Prerequisite: graduate standing. S-U grades optional.
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.

**AN SC 720 Advanced Quantitative Genetics**
Spring. 3 credits. Prerequisites: matrix algebra, linear models, and mathematical statistics. S-U grades optional. Hours TBA.
This course covers statistical methods used in a variety of problems in the quantitative genetics of animal populations. The initial focus is on the estimation of breeding values for purposes of ranking animals for selection. The core of the course is the mixed linear model; linear estimators and predictors are treated extensively. The importance of appropriate modeling is emphasized. Generalizations to nonlinear models, via Bayesian principles, are made, i.e., inferences from posterior distributions.

**AN SC 800 Master's-Level Thesis Research**
Fall or spring. Credit TBA, maximum 12 credits/semester. Prerequisite: permission of adviser. S-U grades only. Graduate faculty.
For students admitted specifically to a master's program.

**AN SC 900 Graduate-Level Thesis Research**
Fall or spring. Credit TBA, maximum 12 credits/semester. Prerequisite: permission of adviser. S-U grades only. Graduate faculty.
For students in a Ph.D. program only before the "A" exam has been passed.

**AN SC 901 Doctoral-Level Thesis Research**
Fall or spring. Credit to be arranged, maximum 12 credits/semester. Prerequisite: permission of adviser. S-U grades only.
Graduate faculty.
For students admitted to candidacy after the "A" exam has been passed.

**Related Courses in Other Departments**

- Introductory Animal Physiology (BIOAP 311)
- Introductory Animal Physiology Laboratory (BIOAP 319)
- Milk Quality (FD SC 351)
- Agriculture in the Developing Nations (IARD 602)
- Lipids (NS 602)
- Basic Immunology Lectures (BIO G 305)

**BIOLOGICAL AND ENVIRONMENTAL ENGINEERING**


Note: Class meeting times are accurate at the time of publication. If changes occur, the department will provide new information as soon as possible.

**BEE 102 Introduction to Microcomputer Applications**
Fall or spring. 3 credits. Letter only. All students, including graduating seniors and pre-enrolled students, must attend the first lecture to guarantee admittance and to select a laboratory section. Lec, fall: T R 12:20-1:10, spring: M 12:20-1:10; labs, M 1:25-4:25 or 7:30-10:30 P.M. or T 1:25-4:25 or W 1:25-4:25 or 7:30-10:30 or R 1:25-4:25 P.M. Fee, $25. P. E. Hillman.
Introduction to application packages on microcomputers. Laboratories provide experience with word processing, object-oriented and bit-mapped graphics, spreadsheets, visual basic macros, database management, presentation graphics, and web page authoring. An independent project using spreadsheets, presentation graphics, and word processing is required. These packages and others such as anti-virus software and those used for searching the Internet for information are discussed and demonstrated in the lectures, along with an overview of computer hardware and health hazards and social issues of computing.

**BEE 110 Introduction to Metal Fabrication Techniques**
Spring. 3 credits. Each lab limited to 18 students. Lec, T R 9:05; labs, M T or R 1:25-4:25, M or T 7:30-10:30. T. J. Cook.
Emphasis is on selection of proper materials and techniques to accomplish a variety of metal fabrication and maintenance projects. Covers hand and machine tools, fasteners, strengths of materials, classification and identification of metals, soldering, brazing, forging, pipe fitting, sheet metal work, controlling distortion, oxyacetylene cutting, and arc welding.

**BEE 132 Introduction to Wood Construction**
Fall. 3 credits. Each lab limited to 15 students. Lec, T R 9:05; labs, T R 1:25-4:25, T or W 7:30-10:30. T. J. Cook.
Principles and practice of wood construction. Covers site selection and preparation, drainage, water and septic development, footers and foundations, material properties, framing and roofing, comparison of alternatives to wood construction, use of hand and power tools, wood joining methods, fasteners, concrete work, and block construction. Each student plans and constructs an approved carpentry project.

**BEE 151 Introduction to Computer Programming**
Fall. 4 credits. Lecs, M W F 11:15-12:05; labs, W R 12-20:2-15, 2:30-4-25, F 1:25-2:30. Each lab and recitation section limited to 22 students. L. D. Allbright.
An introduction to computer programming and concepts of problem solution, algorithm development, and data structure in an engineering context. The programming language MATLAB with Simulink is implemented on personal computers and applied to problems of interest in biological and environmental engineering. No previous programming experience is assumed.

**BEE 200 The BEE Experience**  
Spring. 1 credit. Letter grade only.  
Prerequisite: nonmajors by permission of instructor.  
N. R. Scott.  
A required course for freshman majors in Biological and Environmental Engineering. A forum covering the career opportunities for engineering students and the activities and curricula that lead to these opportunities. A series of seminars are given by practicing engineers, Cornell faculty members, alumni, staff from Cornell career services offices, and students. Students develop their undergraduate course web search assignment to locate jobs and internships, and select future courses to meet their academic objectives and career goals. Not required for students who have completed ENGRG 150.

**BEE 222 Bioengineering**  
Thermodynamics and Kinetics  
Spring. 3 credits. Prerequisite: MATH 192, BIO SCI 110 or equivalent. PHTS 213 and one course in chemistry completed or concurrent.  
L. J. Hunter.  
Living systems rely on chemical and phase equilibria, precise coordination of biochemical pathways, and the release of chemical energy as heat, all of which are governed by the laws of thermodynamics and the rates of chemical reactions. The course covers concepts and laws of thermodynamics as applied to phase transformations, work, heat, and chemical reactions; and reaction kinetics applied to industrial processes and living systems, all with a focus on biological examples.

**BEE 251 Engineering for a Sustainable Society (also ENGRD 251)**  
Fall. 3 credits. Prerequisite: MATH 293 (coregistration permissible).  
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. The students will be introduced to the basic chemistry, ecology, biology, ethics, and environmental legislation relevant to the particular environmental problem. BEE students must complete either BEE 251 or BEE 260 according to their academic plan. BEE students who complete both BEE 251 and BEE 260 will receive engineering credit for only one of these courses.

**BEE 260 Principles of Biological Engineering (also ENGRD 260)**  
Fall. 3 credits. Prerequisite: MATH 293 (coregistration permissible).  
Focuses on the integration of biological principles with engineering, math, and physical principles. Students learn how to formulate costs and design biological systems in class and practice in homework sets. Topic areas 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 251 or BEE 260 according to their academic plan. BEE students who complete both BEE 251 and BEE 260 will receive engineering credit for only one of these courses.

**BEE 299 Sustainable Development: A Web-Based Course**  
Spring. 3 credits. Prerequisite: sophomore standing and above. S-U grades optional.  
N. R. Scott.  
Sustainable development is the dominant economic, environmental, and social issue of the twenty-first century. This web-based course develops the concepts of sustainable development as an evolutionary process, demanding the integration of the physical sciences and engineering with the biological and social sciences for design of systems. Topics include the nature of ecosystems, global processes, sustainable communities, and industrial ecology and life cycle analysis.

**BEE 301 Renewable Energy Systems**  
Spring. 3 credits. Prerequisite: college physics.  
L. D. Albright.  
Introduction to energy systems with emphasis on quantification, design, and programming renewable energy systems to convert environmental inputs into useful forms of energy. Course covers solar energy, small-scale hydropower, wind, bio-conversion processes, house energy balances. Focus is on the technologies and small-scale system design, not policy issues. Use of spreadsheets is extensive.

**BEE 305 Principles of Navigation (also NAV S 301)**  
Fall. 4 credits. 4 classes each week (lecture-recitation-project work).  
L. J. Hunter.  
An introduction to the fundamentals of marine navigation emphasizing piloting and celestial navigation procedures. The course covers coordinate systems, chart projections, navigational aids, compass observations, time, star identification, use of the nautical almanac, tides, and currents. Electronic navigation systems are also briefly discussed.

**BEE 310 Advanced Metal Fabrication Techniques**  
Spring. 1 credit. 2 credit option available.  
T. J. Cook.  
Principles and practices beyond the scope of BEE 110. Includes out-of-position, 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, and plasma arc and oxy cutting of metals are covered. Planning, development, and fabrication of a metal construction project is required for the two-credit option.

**BEE 325 Environmental Management**  
Fall. 3 credits.  
W. J. Jewell.  
Explores the decline in environmental quality caused by human activities and the limits of scientific and technology solutions. Understanding complex issues such as global warming and deriving sustainable solutions are emphasized and illustrated with case studies. Field trips to water supply and waste treatment facilities are included. Emphasis is on water, energy, air quality, and soil evaluations used to illustrate environmental quality problems. (BEE 325 and BEE 625 meet together). BEE 625 students will complete a semester-long design-oriented project.

**BEE 350 Biological and Environmental Transport Processes**  
Fall. 3 credits. Prerequisites: MATH 293 and fluid mechanics (co-registration permissible).  
Focus is on understanding the principles of heat and mass transfer in the context of biological, biomedical, and environmental systems. Physical understanding of transport processes and simple reaction rates with application examples from plant, animal, and human biology, the environment (soil/water/air), and industrial processing of food and biomaterials are emphasized.

**BEE 360 Molecular and Cellular Bioengineering (also BMEM 360)**  
Spring. 3 credits. Prerequisites: biochemistry or AEP 252 or permission of instructor.  
Biological engineering at the molecular and cellular level focusing on different organisms (viruses, bacteria, cells, animals, and plants) and different scales (nano, molecular, cellular, tissue, and environment) with two underlying themes: DNA and cancer; and introduction of quantitative analysis and measurement as well as ethics in molecular and cellular bioengineering with emphasis on integration of molecular and cell biology with engineering.

**BEE 365 Properties of Biological Materials**  
Spring. 3 credits. Prerequisites: ENGRD 250 (coregistration permissible).  
Mechanics and structural properties of biological materials. Mechanical testing of animal, plant, and food products. Laboratory exercises in quasistatic and dynamic testing of materials and interpretation of test results. Experimental techniques for determining engineering properties of these materials. This course satisfies the BEE laboratory experience requirement.

**BEE 368 Biotechnology Applications: Animal Bioreactors**  
Fall. 3 credits. Prerequisite: biochemistry or permission of instructor.  
M. W. 10:10–11:00. R. Gorewit.  
This course 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. Students will be exposed to various design issues, technical constraints, societal concerns, and ethical considerations of this biotechnology.

**BEE 371 Physical Hydrology for Ecosystems**  
Spring. 3 credits. Prerequisite: MATH 192 or permission of instructor.  
Physical hydrological processes and their interaction with ecological systems and human activities. Surface and near-surface processes and interaction to deep groundwater.
hydrology. Topics include hydrologic cycles, watershed hydrology, ecosystem–watershed interactions, runoff generation, physical and biophysical vadose-zone processes, soil erosion, ecohydrology, biogeochemical–watershed budgets. Assignments and lab activities provide opportunities to manipulate, and analyze hydrological data in various contexts.

BEE 427 Water Sampling and Analysis
Fall. 3 credits. Prerequisites: fluids or a hydrology course and MATH 191. Lec, T 9:05–9:55; lab, T 12:20–1:10. D. L. Geohring and T. S. Steenhusen.

Get your feet wet in this course on water sampling methods where science and engineering technologies are integrated to quantify, characterize, and analyze environmental engineering problems. This field-based laboratory course focuses on quantification of surface and subsurface flow and quality, and includes sampling techniques of soils and sediment. Standard environmental site characterization and monitoring methods, quality assurance and control protocols, and interpretation of watershed loading of contaminants are addressed. This course satisfies the BEE laboratory experience requirement.

BEE 435 Principles of Aquaculture
Spring. 3 credits. Prerequisite: must be at least a junior. Lec, W 1:25–2:15. M. R. Timmons.

An in-depth treatment of the principles of aquacultural engineering; mass balances, raceway and raceway systems, fish sickness, nutrition and feed control, and fish health in the context of global and local demand is presented. Course builds upon previous biology and engineering course work and emphasizes fish-production system design. Course includes "hands-on" experiences and field trips. BEE students who wish to take this course to satisfy the BEE capstone design requirement must co-register in BEE 496 for 1 credit hour.

BEE 450 Bioinstrumentation
Spring. 4 credits. Prerequisites: MATH 294, BEE 151, PHYS 213, or permission of instructor. Lec, M W 8:40–9:50; lab, M or W 2:30–4:25. D. Aneshansley.

Biological and biomedical applications are emphasized in this laboratory-based course. The electronic instrument from sensor to computer is considered. Static and dynamic characteristics of components and systems are determined theoretically and empirically. General analog and digital signal condition circuits are designed, constructed, and tested. This course satisfies both the BEE laboratory experience and the BEE capstone design requirement. This course satisfies the College of Engineering technical writing requirement when co-registered in BEE 493.

BEE 453 Computer-Aided Engineering: Applications to Biomedical Processes (also MSE 453)
Spring. 3 credits. Prerequisite: heat and mass transfer (BEE 350 or equivalent). Lec, M W 10:10–11:00; computer disc/ lab, F 10:10 A. K. Datta.

Introduction to simulation-based design as an alternative to prototype-based design. Analysis and optimization of complex real-life processes using industry-standard physics-based computational software on a supercomputer or on high-end personal computers. Biomedical heat and mass transfer processes are covered, including cryosurgery, hyperthermia treatment, laser eye surgery, detection of breast cancer, and drug delivery. Computational topics introduce the finite-element method, pre- and post-processing, and pitfalls of using computational software. Students select their own term project, which is the major component of the course (no final exam). This course satisfies the BEE capstone design requirement.

BEE 454 Physiological Engineering

Engineering analysis and design in the physiology of animals and humans. Covers the use of engineering principles to study how animals work in nature and to intervene in physiological functions. The two major engineering themes are: signal processing as related to neural conduction, sound processing, vision, and image processing; and systems as applied to cardiovascular and respiratory systems, bioenergetics, and bird flight. Laboratory and term project involves experiments, computing applications, field trips, and live animal demonstrations. This course satisfies the BEE laboratory experience requirement.

BEE 456 Biomechanics of Plants (also BIO PL 456)
Fall. 3 credits. Prerequisites: upper division undergraduate or graduate status, completion of introductory sequence in biology and one year of calculus, or permission of instructor. Lec, T R 11:15–12:15; disc, W 11:40–12:50. J. R. Cooke and K. J. Niklas.

An engineering approach is taken to plant biomechanics. Topics include: mechanical behavior of materials, effect of geometry on mechanical behavior, plant-water relations, plant cell walls, mechanical behavior of tissues, mechanical attributes of organs, the plant body, fluid mechanics and biomechanics, and plant evolution.

BEE 459 Biosensors and Bioanalytical Techniques
Spring. 4 credits. Prerequisites: biochemistry or physiology of instructor. Lec, W 8:40–9:55; lab, M 12:20–1:25 and 7:30–10:30 P.M. A. J. Bauman.

This course provides students with an understanding of the scientific and engineering principles of biosensors and bioanalytical techniques. The course addresses selected topics from simple biosensors to micro/nanofabricated Micro Total Analysis Systems (MicroTAS). Biosensor and Micro TAS applications in food analysis, food safety, and medical diagnostics are explored. Students gain an understanding of the course through presentation by the instructor in the laboratory, and prepare a poster in a biosensor workshop at the end of the semester. Undergraduate students work together in teams of 2 to 4 students. This course satisfies the BEE capstone design requirement and the BEE laboratory experience requirement for engineering students.

BEE 464 Bioseparation Processes
Fall. 3 credits. Prerequisites: biochemistry and physics, MATH 112 or 192, BEE 260 or equivalent, or permission of instructor. Not offered fall 2004. Lec, M W F 12:20–1:10. J. B. Hunter.

Bioseparation is the science and engineering of fractionating and purifying biological materials: DNA, proteins, living cells, antibiotics, biofuels, and even foods. The course covers separation methods used in the biotechnology industry, principles governing these methods, approaches to improving bioseparation performance, and the special challenges of scale-up. Key topics (centrifugation, filtration, extraction, membrane methods, ion exchange, chromatography, electrophoresis) will be supplemented with student presentations. Intended for seniors and graduate students in engineering, chemistry, biology, and food science.

BEE 471 Introduction to Groundwater (also CEE 431 and EAS 445)
Spring. 3 credits. Prerequisites: MATH 293, fluid mechanics or hydrology course. 2 lecs, 1 disc, lecture, field trip. L. M. Cathles, T. S. Steenhusen.

Intermediate-level study of aquifer geology, groundwater flow, and contamination of aquifers and cleanup methods. Includes descriptions of transport of pesticides, nutrients and toxicants through the unsaturated zone and aquifers. Theoretical applications and case studies are discussed. Short field trips are included.

BEE 473 Watershed Engineering
Fall. 3 credits. Prerequisite: fluid mechanics or hydrology. Lecs, T R 10:10–11:00; disc, R 12:25–1:30. M. F. Walter.

Engineering principles are applied to the design of management strategies for solving natural resource problems in the context of watersheds. Emphasis is placed on rural systems and small-scale design for water conveyance, soil erosion control, flood damage control, earthen dams, ponds, moisture conservation, drainage, and water supply. BEE students who wish to take this course to satisfy the BEE capstone design requirement, must co-register in BEE 496 for one credit hour. This course satisfies the College of Engineering technical writing requirement when co-registered in BEE 493.

BEE 474 Water and Landscape Engineering Applications
Spring. 3 credits. Prerequisites: fluid mechanics or hydrology or permission of instructor. Lecs, M W F 10:10–11:00. T. R 11:15–12:05. T. S. Steenhusen and L. D. Geohring.

This course addresses water–soil interactions and methods to solve water management problems in humid and arid ecosystems. The main focus is on drainage and irrigation systems. Emphasis is placed on the practical application of hydrology and hydraulics for solving problems in agriculture and nonagricultural settings. A major design project is required and all course requirements are evaluated. This course satisfies the BEE capstone design requirement.

BEE 475 Environmental Systems Analysis
Fall. 3 credits. Prerequisites: computer programming, and 1 year of calculus. Lecs, T R 11:10–12:55. D. A. Haith.

Applications of mathematical modeling, simulation, and optimization to environmental-qualtiy management. Fate and transport models for contaminants in air, water, and soil. Optimization methods (e.g., linear programming) to evaluate alternatives for solid-waste management and water and air-pollution control. Introduction to hydrologic simulation (runoff and streamflow).
offer a systems approach to understanding renewable energy systems (solar, wind, and biomass) and their conversion processes, from various aspects of biology, physics, engineering, environmental impacts, economics, and sustainable development.

**BEE 489 Engineering Entrepreneurship, Management, and Ethics**
The course focuses on engineering entrepreneurship, economics, management, and professional ethics. Course objectives include coverage of: prediction/probability of net returns; financial calculations (internal rate of return, time value of money, pro forma statements); legal structures of businesses; project management; developing an awareness of issues related to professional ethics; and technical writing and communication. Group project required to produce a business plan for a technology-driven concept suitable for a venture fair audience. This course satisfies the College of Engineering technical writing requirement.

**BEE 493 Technical Writing for Engineers**
Fall or spring. 1 credit. Prerequisites: co-registration with BEE 473 (fall), BEE 450 (spring). Lec. M 7:30--9:25 (5 evenings in first half of semester). Staff.
This course meets the College of Engineering technical writing requirement when taken concurrently with BEE 473 in the fall or BEE 450 in the spring. Class meets for five evening sessions and covers writing skills necessary for technical project reports. Also considered: outlines, style, audience, and general writing mechanics.

**BEE 494 Special Topics in Biological and Environmental Engineering**
Fall or spring. 4 credits maximum. S-U grades optional. Staff.
The department teaches "trials" courses under this number. Offerings vary by semester and are advertised by the course number. 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.

**BEE 495 BEE Honors Research**
Fall or spring. 1-6 variable credits. Prerequisite: enrollment in the BEE Research Honors program. Letter grade. Staff.
Intended for students pursuing the Research Honors Program in BEE. Students must complete the Honors program application by the 3rd week of the fall semester, senior year.

**BEE 496 Capstone Design in Biological and Environmental Engineering**
Fall and spring. 1-6 credits. credits. Prerequisites:

**BEE 497 Individual Study in Biological and Environmental Engineering**
Fall and spring. 1-4 credits. S-U option. Prerequisites: written permission of instructor and adequate ability and training for the work proposed. Normally reserved for seniors in the upper two-fifths of their class. Students must register using an independent study form (available in 140 Roberts Hall). 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 498 Undergraduate Teaching**
Fall and spring. 1 credit. Prerequisite: written permission of instructor. Students must register using an Independent Study form (available in 140 Roberts Hall). Staff.
The student assists in teaching a biological and environmental engineering course appropriate to his/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 499 Undergraduate Research**
Fall and spring. 1-4 credits. Prerequisite: normally reserved for seniors in the upper two-fifths of their class; adequate training for work proposed; and written permission of instructor. Students must register using an Independent Study form (available in 140 Roberts Hall). 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 501 Bioengineering Seminar (also BMEP 501)**
Fall, spring. 1 credit. For juniors, seniors, and graduate students only. D. Luo and D. Putnam. Broad survey of all aspects of bioengineering, including biomedical, bioprocess, biological, and bioenvironmental engineering and aspects of biotechnology. Sessions may be technical presentations for discussions. Sessions may occasionally be held outside of scheduled times.

**BEE 520 M.P.S. Project**
Fall and spring. 1-6 credits. Required of each M.P.S. candidate in the field. BEE graduate faculty. A comprehensive project emphasizing the application of agricultural technology to the solution of a real problem.

**BEE 551-552 Agricultural and Biological Engineering Design Project**
Fall and spring. 4-6 credits. Prerequisite: admission to the M.Eng. degree program. ABEN graduate students only. Comprehensive design projects dealing with existing engineering problems in the field. Emphasis is on the formulation of alternative design proposals that include consideration of economic, nontechnical factors, engineering analysis, and complete design for the best design solution. Projects are supervised by faculty members on an individual basis. There is, however, a formal orientation
during the first four weeks of the semester. A formal report and public presentation of the results of the design project are required for completion of the course(s). A minimum of 3 to a maximum of 12 credits of 551-552 is required for the M. Eng. degree. Students should register for 551 their first semester and complete any additional design project credits with 552. If more than six design project credits are desired in one semester, both 551 and 552 may be taken.

BEE 625 Environmental Management
Fall. 3 credits. Lec., T'R 2:55-4:10. W. J. Jewell
For description, see BEE 325.

[BEE 647 Water Transport in Plants (also BIOPL 651)]
Fall. 2 credits. Lec., T'R 10:10-11:00.
Topics include water relations of plant cells and tissues using water potential terminology; permeability of plant cells to water and the role of aquaporins; transport of water through whole plants, including transpiration, stomatal physiology, and the modifications due to plant communities; water status and plant growth in relation to water stress.

BEE 649 Solute Transport in Plants (also BIOPL 649)
Fall. 3 credits. Lec., T'R 10:10-11:25.
Offered alternate years. R. M. Spanwick.
A fundamental treatment of the transport of ions and small organic molecules in plants. Topics will include: electrophysiology of cell membranes, including ion channels and electrogenic ion pumps; transport mechanisms for the major ions; intercellular and long-distance ion transport; excretory systems for sugars and amino acids; phloem transport; ABC-type transporters.

BEE 651 Bioremediation: Engineering Organisms to Clean Up the Environment
Spring. 3 credits. Prerequisites: BIOMI 290 or BIOIM 498 or BIOMI 531 or permission of instructor. Lec., T'R 10:10-11:00.
B. Ahner
This course examines ways in which organisms may be used to remove or metabolize pollutants in the environment, including bacterial degradation of organics and phytoremediation of heavy metals. Through lectures and current literature, students evaluate the benefits as well as the current obstacles. The current efforts to genetically engineer organisms for bio remediation and the potential risks of releasing them into the environment are examined.

BEE 652 Instrumentation: Sensors and Transducers
Spring. 3 credits. Prerequisites: linear differential equations, introductory chemistry, and introductory physics, or permission of instructor. Lec., T'R 12:20-1:10; lab, 2:00-4:25.
D. J. Anstee
Application of instrumentation concepts and systems to the measurement of environmental, biological, and agricultural phenomena. Construction and characterization of electronic sensors and transducers is emphasized. Image processing techniques are introduced. A final project is required.

BEE 655 Thermodynamics and Its Applications
Spring. 3 credits. Prerequisite: MATH 295 or equivalent. Lec., R 2:30-4:30.
J.-Y. Parlange
Thermodynamics and its applications to problems in engineering and agriculture. Topics include basic concepts (equilibrium, entropy, processes, systems, potentials, stability, phase transitions) and applications (soil and water processes, dilute solutions, electromagnetism, surface phenomena, heat and mass transport, and structure of organizations).

BEE 659 Biosensors and Bioanalytical Techniques
Spring. 4 credits. Prerequisites: BIOMI 398 or permission of instructor. Lec., T'R 8:40-9:55; lab, M 1:25-4:25 and 7:30-10:30 P.M. A. J. Baeumner.
This course provides students with an understanding of the scientific and engineering principles of biosensors and bioanalytical techniques. The course 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, prepare a biosensor of their choice in the laboratory, and present a poster in a biosensor workshop at the end of the semester. Graduate students work independently on individual biosensor projects.

BEE 671 Analysis of the Flow of Water and Chemicals in Soils
Fall. 3 credits. Prerequisites: four calculus courses and fluid mechanics. Lec., R 3:35-4:50 (first meeting—TBA). J.-Y. Parlange.
The course 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. Current analytical, semi-analytical, and computer-based techniques are discussed. Both homogeneous and heterogeneous soils are analyzed. Offered alternately with CEE 653—a complementary, but not identical, course.

BEE 672 Drainage
Theory of water and solute flow in aquifers, hill slopes, and the vadose zone and as it relates to natural and artificial drainage is discussed. Drainage design as it relates to agricultural land, landslides, and land application sites is critically reviewed. The importance of preferential flow and matrix flow on water quality of drainage waters is examined. Laboratory are used for hands-on experience with measuring soil parameters and for actual drainage design. This course satisfies the BEE capstone design experience requirement.

BEE 673 Sustainable Development Seminar (also NBA 573)
Spring. 1-3 credits. Prerequisites: upper-division undergraduate and graduate students or permission of instructor. Lec., F'1:30-3:30. N. R. Scott.
Sustainable development is the most beneficial concept to environmental movement in years. The concept of a sustainable world, however, is not a constant. There are many aspects of sustainability involving economics, environment, and political, social, scientific, and technological developments. This seminar explores topics such as energy, agricultural and food systems, green buildings and ecological design, corporate sustainability, and other contemporary issues.

BEE 678 Nonpoint Source Models
Spring. 3 credits. Prerequisites: computer programming and calculus. Lec., T'R 8:40-9:55. D. A. Haith.
Development and programming of simulation models for management of water pollution from runoff and percolation. Emphasis is on prediction of water and chemical inputs to surface waters and groundwater. Applications include watershed hydrology, sediment yield, urban and rural runoff, lake eutrophication, waste disposal sites, and pesticides, nutrients, and salts in drainage.

BEE 685 Biological Engineering Analysis
Spring. 4 credits. Prerequisites: TRAM 310 or permission of instructor. Lecs., M W F 11:15-12:05. J. R. Cooke.
Engineering problem-solving strategies and techniques are explored. Students solve several representative engineering problems that inherently involve biological properties. Emphasis is on formulation and solution of mathematical models and the interpretation of results. The student's knowledge of fundamental principles is used extensively.

BEE 687 The Science and Engineering Challenges to the Development of Sustainable Bio-Based Industries
Fall. 1 credit. Prerequisite: graduate standing. Lec., R 12:20-1:10; disc, R 1:25-2:15. B. Ahner.
Environmentally sustainable alternatives for our energy and chemical needs are critical. This seminar 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 694 Graduate Special Topics in Agricultural and Biological Engineering
Fall or spring. 4 credits maximum. S-U grades optional. ABEN graduate faculty. The department teaches "trial" courses under this number. Offerings vary by semester, and are advertised by the department. 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.

BEE 697 Graduate Individual Study in Agricultural and Biological Engineering
Fall or spring. 1-6 credits. Prerequisite: permission of instructor. S-U grades optional. ABEN graduate faculty. Topics are arranged by the staff at the beginning of the term.
BEE 700 General Seminar  Fall. 1 credit. S-U grades only. Staff. Presentation and discussion of research and special developments in agricultural and biological engineering and related fields.

BEE 740 Veterinary Perspectives on Pathogen Control in Animal Manure (also VF MED 740 and BIOM 740)  Spring. 2 credits. Prerequisite: graduate standing or permission of instructor. Lect. M T W R 3:00–4:00, March 24–May 16. D. D. Bowman. Presents an in-depth look at the management of pathogens in animal manures. It reviews the pathogens involved, the role of governing agencies, the survival of pathogens in the field, and methods of pathogen destruction. The course discusses commercial methods of manure processing for the control of pathogens for the protection of other animals and the human population. The course concludes with class discussions with major stakeholder groups representing the dairy, beef, pork, and poultry industries and their understanding of the problem as it relates to veterinary students.

BEE 750 Orientation to Graduate Study  Fall. 1 credit. Limited to new graduate students. S-U grades only. Lecs. first 7 weeks, M 3:35–4:25. D. J. Aneshansley. An introduction to ABEN research policy, programs, methodology, resources, and degree candidates' responsibilities and opportunities.

BEE 754 Watershed Management  Spring. 2–3 credits. Prerequisite: graduate standing or permission of instructors. Lect. W 2:30–4:25, T. S. Steenhuis and M. J. Pfeffer. Traditional top-down approaches to watershed management have been challenged by advocates of public participation. These challenges have raised questions about how to effectively integrate science, policy, and public participation. This course reviews different management approaches and evaluates their usefulness in dealing with different watershed management problems. Case examples from watersheds in the United States and overseas are considered.

BEE 760 Nucleic Acid Engineering (also BMEP 760)  Spring. 3 credits. Prerequisites: BEE 360 or permission of instructor. Lect. T R 2:30–3:20; lab, W 12:20–2:15. 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 are introduced, including tool kits for nucleic acid engineering and current examples of DNA-based engineering, DNA nanotechnology, and DNA-based medicine. A design project and formal project presentation are required.

BEE 771 Soil and Water Engineering Seminar  Fall and spring. 1–3 credits. Prerequisite: graduate status or permission of instructor. S-U grades only. J. Y. Parlange and M. F. Walter. Study and discussion of research or design procedures related to selected topics in irrigation, drainage, erosion control, hydrology, and water quality.

BEE 771 Structures and Related Topics Seminar  Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only: TBA. Staff. Advanced analysis and design of production systems with emphasis on structural and environmental requirements, biological responses, and economic considerations.

BEE 775 Biological Engineering Seminar  Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only. J. R. Cooke. The interactions of engineering and biology, especially the environmental aspects of plant, animal, and human physiology, are examined to improve communication between engineers and biologists.

BEE 778 Industrial Ecology of Agriculture and Biobased Industries  Spring. 3 credits. Prerequisites: one year of calculus, some knowledge of Matlab. BEE 687 limited to graduate students. L. P. Walker. Input/output modeling methods are used to explore the use of the industrial ecology perspective for the design and analysis of sustainable bio-based industries.

BEE 788 Biomass Conversion of Energy and Chemicals  Fall. 3 credits. Prerequisite: one year of college calculus and chemistry. Minimum of one course in thermodynamics and computer programming. Lect. M W F 1:25–2:15. 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. Using mass and energy balances and mathematical models (with Matlab) to simulate process behavior.

BEE 800 Master's-Level Thesis Research  Fall and spring. 1–15 credits. Prerequisite: permission of adviser. S-U grades. ABEN graduate faculty.

BEE 900 Doctoral-Level Thesis Research  Fall and spring. 1–15 credits. Prerequisite: permission of adviser. S-U grades. ABEN graduate faculty. Variable credit for Ph.D. research.

BIOMETRIC AND STATISTICS

BIOMETRY AND STATISTICS

M. Wells, chair, J. Booth, C. Bustamante, R. Nielsen, S. J. Schwager, R. Strawderman

The Department of Biological Statistics and Computational Biology in the Statistical Science offers the following courses in Biometry and Statistics. Students need to register under Course Listings: College of Agriculture and Life Sciences—Biometry and Statistics.

BTRY 301 Biological Statistics I (also NTRES 313 and STBTRY 301)  Fall and summer. 4 credits. Prerequisite: BTRY 301 or BTRY 601. Statistical methods are developed and applied 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 S-Plus statistical computing environment.

BTRY 302 Biological Statistics II (also NTRES 413 and STBTRY 302)  Spring. 4 credits. Prerequisite: BTRY 301 or BTRY 601. Linear statistical methods are applied 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 multifactore analysis of variance (ANOVA), and a brief foray into nonlinear modeling. Applied analysis is carried out in the S-Plus statistical computing environment.

BTRY 382 Introduction to Statistical Genomics and Bioinformatics (also STBTRY 382)  Fall. 4 credits. Prerequisite: BTRY 101, MATH 111, BIO G 102, or equivalent. Survey course focusing on the statistical analysis of genomic data. The course includes an introduction to probability and statistics and application to DNA sequence analysis, phylogenetic inference, population genetics, genetic mapping, molecular evolution, and macromolecular structure prediction. The course is intended for undergraduates and beginning graduate students in the mathematical and biological sciences. Evaluation is based on weekly problem sets and computer assignments as well as a midterm and final examination.

BTRY 408 Theory and Probability (also STBTRY 408)  Fall. 4 credits. Prerequisites: MATH 111, 112, at least concurrent enrollment in 213 or 222 or equivalents. An introduction to probability theory: axiomatic foundations; both discrete and continuous equally likely events; conditional probability and independence; discrete and continuous random variables, their distributions and moments; generating functions; transformations; extension of probability 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. At least one introductory course in statistical methods is additionally recommended but not required.

BTRY 409 Theory of Statistics (also STBTRY 409)  Spring. 4 credits. Prerequisites: BTRY 408 or equivalent and at least one introductory course in statistics.
An introduction to classical theory of parametric statistical inference that builds on the material covered in BTRY 408. Topics include sampling distributions, principles of data reduction, likelihood, parameter estimation, hypothesis testing, interval estimation, and basic asymptotic theory.

**BTRY 421 Matrix Computation**

Fall. 4 credits. Prerequisite: Calculus. Not offered 2004–2005.

Introductory course in matrix computations that reviews linear algebra (vector spaces, linear independence) and emphasizes a matrix approach to solving systems (LU-factorization, QR-decomposition, SVD, Schur complements) and the role of the condition number of a matrix. Positive definite matrices, eigenvalues, and their applications in mathematical modeling and statistics are discussed.

**BTRY 482 Statistical Genomics (also STBTRY 482)**

Spring. 4 credits. S-U grades optional. Prerequisite: BTRY 382 or equivalent.

This course covers topics in the statistical analysis of genetic, molecular, and genomic data, including the statistics of DNA database searches and alignment, statistical methods in molecular evolution, population genetics, phylogenetics, molecular ecology, forensic genetics, the analysis of comparative molecular data, QTL mapping, and association mapping. Topics may vary from year to year. This course will be co-taught with BTRY 482. However, undergraduate students will be evaluated on the basis of a final exam and a term paper instead of a research project.

**BTRY 494 Undergraduate Special Topics in Biometry and Statistics (also STBTRY 494)**

Fall or spring. 1–3 credits. S-U grades optional.

A course of lectures selected by the faculty. Because topics usually change from year to year, this course may be repeated for credit.

**BTRY 495 Statistical Consulting (also STBTRY 495)**

Fall and spring. 2–3 credits. Prerequisites or corequisites: BTRY 302 or BTRY 600 and BTRY 409 or permission of instructor. S-U grades optional.

Participation in the Department of Biological Statistics and Computational Biology consulting service: 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 497 Undergraduate Individual Study in Biometry and Statistics (also STBTRY 497)**

Fall and spring. 1–3 credits. S-U grades optional. Students must register using an 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 498 Undergraduate Supervised Teaching (also STBTRY 498)**

Fall and spring. 2 credits. S-U grades optional. Students must register using an 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 499 Undergraduate Research (also STBTRY 499)**

Fall or spring. 1–3 credits. S-U grades optional. Limited to statistics and biometry undergraduates. Prerequisite: permission of faculty member directing research. Students register using an Independent Study form (available in 140 Roberts Hall).

**BTRY 600 Statistics Seminar (also STBTRY 600)**

Fall and spring. 1 credit. S-U grades optional. Prerequisite or concurrent: BTRY 409 or permission of instructor.

**BTRY 601 Statistical Methods I (also STBTRY 601)**

Fall and summer. 4 credits. Limited to graduate students; others by permission of instructor.

Statistical methods are developed and used 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, and related techniques including generalized estimating equations and robust estimation. Programming will be done in MATLAB. The focus of the course is on the use of numerical analysis methods for solving problems in statistical inference and estimation.

**BTRY 672 Topics in Environmental Statistics (also STBTRY 672)**

Fall and spring. 2 credits. S-U grades optional. Prerequisite: BTRY 601 or permission of the instructor. Not offered 2004–2005.

This course is a discussion group focusing on statistical problems arising in the environmental sciences. These issues are explored in a number of different ways, such as student presentations of research papers, directed readings, and outside speakers.

**BTRY 682 Statistical Genomics (also STBTRY 682)**

Spring. 4 credits. S-U grades optional. Prerequisite: BTRY 382 or equivalent.

This course covers topics in the statistical analysis of genetic, molecular, and genomic data, including the statistics of DNA database searches and alignment, statistical methods in molecular evolution, population genetics, phylogenetics, molecular ecology, forensic genetics, the analysis of comparative molecular data, QTL mapping, and association mapping. Topics may vary from year to year. All students are expected to participate in small research projects.

**BTRY 694 Graduate Special Topics in Biometry and Statistics (also STBTRY 694)**

Fall or spring. 1–3 credits. S-U grades optional. A course of lectures selected by the faculty. Because topics usually change from year to year, this course may be repeated for credit.

**BTRY 697 Individual Graduate Study in Biometry and Statistics (also STBTRY 697)**

Fall, spring, or summer. 1–3 credits. S-U grades optional.

Consists of individual tutorial study selected by the faculty. Because topics usually change from year to year, this course may be repeated for credit.

Applications of experimental design including such advanced designs as split plots, incomplete blocks, fractional factorials. Use of the computer for both design and analysis is stressed, with emphasis on solutions of real data problems.
BTRY 717 Linear and Generalized Linear Models (also STBTRY 717)

Fall. 3 credits. S-U grades optional. Prerequisites: BTRY 409, BTRY 421, and BTRY 602 or equivalents. Offered alternate years.

Statistical modeling and inference using linear models and generalized linear models. Estimation by least squares, maximum likelihood, quasi-likelihood, and generalized estimating equations. Covers the use of link functions and generalized linear models to accommodate nonlinear models and nonnormally distributed data. Also covers the use of random effects to accommodate a hierarchy of random effects in both linear mixed models and generalized linear mixed models and to model longitudinal data. Some use of software packages and illustrative examples.

BTRY 726 Problems and Perspectives in Computational Molecular Biology (also PL BR 726 and COM S 726)

Fall and spring. 1 credit. S-U grades only. Prerequisite: permission of instructor. This is a weekly seminar series discussing timely topics of computational molecular biology. These methodological approaches to sequence annotation, protein structures in both linear mixed models and generalized linear mixed models and to model longitudinal data. Some use of software packages and illustrative examples.

BTRY 795 Statistical Consulting (also STBTRY 795)

Fall and spring. 2-3 credits. Prerequisites or corequisites: BTRY 602 and BTRY 409 and permission of instructor. S-U grades optional. Participation in the Department of Biological Statistics and Computational Biology consulting service: 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 798 Graduate Supervised Teaching (also STBTRY 798)

Fall and spring. 2-4 credits. S-U grades only. Permission of instructor and chair of special committee plus at least two advanced courses in statistics and biometry. 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 800 Master's-Level Thesis Research

Fall or spring. Credit TBA. S-U grades only. Limited to candidates for graduate degrees. Prerequisite: permission of the graduate field member concerned. Research at the M.S. level.

BTRY 900 Graduate-Level Dissertation Research

Fall or spring. Credit TBA. S-U grades only. Limited to candidates for graduate degrees. Prerequisite: permission of the graduate field member concerned. Research at the Ph.D. level.

BTRY 901 Doctoral-Level Dissertation Research

Fall or spring. Credit TBA. S-U grades only.

COMM 100 Communication in Social Relationships

Spring or summer. 3 credits. Spring: lecs, M W F 11:15-12:05. K. McComas. An overview of current knowledge about communication, with particular emphasis on interpersonal communication. Introduction to a wide range of contemporary theories and research about effective communication in contexts such as friendships, small groups, and organizations.

COMM 116 Communication in Social Relationships

Spring or summer. 3 credits. Spring: lecs, M W F 11:15-12:05. K. McComas. An overview of current knowledge about communication, with particular emphasis on interpersonal communication. Introduction to a wide range of contemporary theories and research about effective communication in contexts such as friendships, small groups, and organizations.

COMM 117 Writing about Communication


COMM 120 Contemporary Mass Communication

Fall or summer. Fall: lecs, M W F 12:20-1:10. J. Shanahan. The processes and effects of mass communication systems. Topics include the evolution of communication media, current knowledge about mediated communication, and the role of communication in contemporary social issues.

COMM 201 Oral Communication

Fall, spring, or summer. 3 credits. Each section limited to 20 students (fall and spring) or 15 students (summer). Preference given to sophomores, juniors, and seniors. Fluency in spoken English is assumed. Students missing the first two class meetings without university excuse are dropped so others may register. No student will be added or dropped after the second week of classes. K. Berggren, T. Russo, 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 203 Argumentation and Debate

Fall, spring, and summer. 3 credits. Fall: T R 11:40-12:55; spring: T R 11:40-12:55. J. Hayman. Students learn the principles of argumentation and debate. Topics emphasize Internet database research, synthesis of collected data, analysis of evidentiary quality, refutation of counter claims, identification of logical fallacies, risk evaluation, framing of issues, and coherent storytelling. Students are prepared to work with a great range of opinion and evidence. The course emphasizes different viewpoints, including those of different cultures. Assumptions are questioned and interrogated.

COMM 220 Mass Media and Society

Spring. 3 credits. T R 11:40-12:55. T. Gillespie. This course provides an overview of the influence of mass media on and in democratic societies. We begin by examining social theories that formed the bases for the emerging discipline of mass-communication research around the turn of the century. Then, we trace the evolution of mass-media research across four dominant paradigms: hypodermic needle, limited effects, return to powerful effects, and negotiated meaning/social construction models. Finally, media effects on social institutions are assessed.

COMM 230 Introduction to Computer-Mediated Communication

Fall. 3 credits. Not offered 2004-2005. T R 10:10-11:25. Staff. Explores the nature of communication and how it is affected by technologies. Topics include a history of communication technologies and function, types of Internet communication systems, barriers and benefits, and descriptions of uses and impacts in cultural, professional, community, and personal social systems.

COMM 235 Psychology and Social Computing (also INFO 235)

Fall. 3 credits. T R 10:10-11:00. J. Walther. The course offers an in-depth examination of several social aspects of computing, drawing upon recent and classical social psychology and social-cognition research. A small number of topics will be closely examined and may include impression formation/management, group behavior, deception and trust, disinhibition, and online relationships.
COMM 260 Science Writing for Public Information
Fall, spring, or summer. 3 credits. Limited to 25 nonfreshman or graduate students per section. Prerequisite: one college-level writing course. Fall: Lec 01, M W F 9:05-9:55, Lec 02, M W F 10:10-11:00. Spring: Lec 01, M W F 9:05-9:55 or Lec 02, M W F 1:25-2:15. S. Connar.
An intensive course in simplifying scientific and technical material for specific audiences within the general public. Weekly assignments include instructions, descriptions, explanations, and summaries in such formats as the newsletter, brochure, and report. Audience analysis is emphasized. Not oriented to the mass media.

COMM 263 Organizational Writing
Fall, spring, or summer. 3 credits. Limited to 25 junior, senior, or graduate students per section. Prerequisite: any college-level writing course. Fall: Lec 01, M W F 9:05-9:55, Lec 02, M W F 10:10-11:00, Lec 03, M W F 11:15-12:05. Spring: Lec 01, M W F 10:10-11:00, Lec 02, M W F 11:15-12:05. L. Van Buskirk and staff.
Students write from the point of view of various organizations, including businesses, government agencies, and nonprofit organizations. Emphasis is on appropriate representation of the writer's organization, audience analysis, and clear and effective written presentation of detailed content. Assignments include text for web sites, reports, proposals, memoranda, letters, and e-mail.

COMM 272 Principles of Public Relations and Advertising
Summer. 3 credits. Not open to freshmen. Staff.
Survey of the fields of public relations and advertising. Descriptions of organizations, jobs, and functions in the industry. 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 282 Communication Industry Research
Fall. 3 credits. Prerequisite or concurrent enrollment. COMM 116, 120. Lec. M W F 11:15-12:05. R. Ostman.
Public opinion polls, readership/viewership studies, audience segmentation techniques, and media and message effect evaluation are all widely used in communication industries. This course covers the use of basic research design, measurement, sampling, and simple descriptive and inferential statistics in conducting these studies.

COMM 284 Sex, Gender, and Communication
Fall. 3 credits. Not open to freshmen. T R 2:55-4:10. L. Van Buskirk.
The course explores the personal, career, social, and economic implications of gender categories. Topics considered include theories of gender construction, social structures, personal relationships, and gender concerns in the workplace.

COMM 285 Communication in Life Sciences (also S&TS 285)
Spring. 3 credits. M W F 10:10-11:05. B. Lewenstein.
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 notes to the web, communication helps define social issues and research findings. This course examines the institutional and intellectual contexts, processes, and practical constraints on communication in the life sciences.

COMM 301 Business and Professional Presentation
The study and practice of written and oral communication skills used in formal and informal organizations. This includes interviews; informative, persuasive, and special-occasion speeches; reports; discussions; and PowerPoint presentations. Students study and practice the organizational, analytical, and presentational skills needed in contexts suited to their own business and professional career goals.

COMM 303 Speech and Debate Practicum
Fall and spring. 2 credits. Program in Speech and Debate members only; permission of instructor and completion of 1-year trial basis. J. Hayman.
Students learn preparation for practice in intercollegiate speech and debate (e.g., Lincoln-Douglas, 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 eight credits.

COMM 345 Human-Computer Interaction Design (also INFO 345)
Covers key issues of the design of the interaction between computers and people. Students develop the ability to evaluate solutions to design problems and a familiarity with implementing HCI designs.

COMM 349 Media Technologies (also S&TS 349)
Commonplace notions of communication and media regularly overlook the role of the material technologies. Yet how and why we communicate shape the technologies we design. There are technologies that make our efforts to communicate and the consequences of those efforts. This course considers technologies of media as an opportunity to analyze the intersection of technology and its social context.

COMM 350 Writing for Magazines
Fall, spring, and summer. 3 credits. Prerequisite: any college-level writing course. Limited to 25 juniors, seniors, and graduate students, or others with permission of instructor. No drops after third week. Extensive out-of-class writing assignments. Fall: M 1:25-2:45, spring: lec, T R 8:40-9:55, lab, R 1:25-2:15. S. Conopre.
A course in nonfiction freelance writing for magazines. Intensive fact writing to help students communicate more effectively through the medium of the printed word in magazines. Art and techniques of good writing are studied; magazines in many fields of interest are reviewed; all articles are analyzed and returned to the student to rewrite and submit to a magazine.

COMM 352 Science Writing for the Mass Media (also S&TS 352)
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 newsletters, radio, TV, and other media.

COMM 353 Science Writing Practicum
Spring. 1 credit. Prerequisite: COMM 200, COMM/S&TS 352, ENGRD 350, or permission of instructor. Limited to 25 even-numbered years. 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 376 Planning Communication Campaigns
Fall. 3 credits. Prerequisites: COMM 282 or equivalent social research course (may be taken concurrently). T R 10:10-12:25. K. McComas.
This course provides a theoretical and practical overview of the audiences, messages, and evaluation of communication campaigns. Principles of planning and evaluation relevant to several kinds of campaigns are included. Topics include discussion of campaign goals, objectives, strategies, and tactics; research design and implementation; audience segmentation; message construction; and techniques of evaluation. Common methods of data collection (e.g., focus groups, experiments, surveys) and analysis of campaign-related data sources are considered.

COMM 382 Advanced Communication Research
Fall. 3 credits. Prerequisites: COMM 282 or equivalent social research course. TBA. J. Walther.
Advanced approaches to methods of data collection and analysis in communication research for students who intend to complete advanced research projects such as honors research or other independent studies and who have preliminary research under way. Every week we examine one or two research situations in detail, analyze specific problems connected to the method used, and discuss strategies for data analysis and presentation. This format provides all students—indeed, independent of their specific thesis topic—with an in-depth understanding of the methods used in communication research and how they are applied to specific projects.
COMM 398 Issues in Teaching Communication
Fall and spring. 1 credit. Prerequisite: must be past or current undergraduate teaching assistant for 201, 204, or 301. Alternate M 7:30-9:10 p.m. K. Berggren. This seminar brings together novice educators to discuss ideas, experiences, and practice. Emphasis is on offering and receiving feedback on one another's teaching efforts and offering challenges for professional educators to discuss ideas, experiences, and practice. 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 405 Community Service Practicum
Fall and spring. 2 credits. May be repeated for credit. Meeting times TBA. J. Hayman. 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 410 Organizational Communication: Theory and Practice
Fall. 3 credits. Labs limited to 15 juniors, senior, or graduate students. Prerequisite: COMM 116 or permission of instructor. Lect. M W 11:15-12:05, lab 01, W 12:20-2:15; lab 02, W 2:30-4:15; lab 03, R 12:20-2:15; lab 04, C. Yuan. Study of management communication processes in formal organizations. Application of relevant organizational behavior and communication principles in today's business environment, examination of formal and informal communication networks, and exploration into the craft of consulting. Case studies analyzed in lab.

COMM 418 Communication and Persuasion
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: COMM 282 or equivalent social science research methods course; and COMM 116 and 120 or introductory psychology or social psychology. T R 10:10-11:20. C. Yuan. Focuses on persuasion and attitude change. Students become familiar with a variety of social-psychological theories of attitude change and persuasion. These theories are applied to a variety of communication situations, including mass communication, advertising, public relations, public information, and interpersonal communication.

COMM 420 Public Opinion and Social Processes
Fall. 3 credits. M W 2:55-4:10. Staff. Provides an overview of the concept of "public opinion" and its implications for macrosocial processes—from both a scientific and an applied angle. The course examines the historical development of the concept in fields such as political science, social psychology, and communication science, and then takes a look at how we measure public opinion. The course is based on "public opinion," and we will focus on the importance of public opinion and public opinion perception for different aspects of democratic societies, such as policymaking, risk perceptions, or political participation.

COMM 421 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.

COMM 422 Psychology of Television (and Beyond)
Fall. 3 credits. Prerequisites: introductory psychology or HD 120 or COMM 120 or COMM 116. Lect. M W F 12:20-1:10. M. Shapiro. A survey of knowledge about how people mentally process television and other audiovisual communication technologies—including movies, virtual reality, and the Internet. Topics include why people watch, what happens mentally when they watch, how people understand and mentally process media, and how media psychologically influence beliefs, attitudes, thinking, and emotion.

COMM 424 Communication in the Developing Nations
Fall. 3 credits. Limited to juniors and seniors. Lect. T 1:25-2:35; Lab, T 2:35-4:25. R. Collie. The role of communication in development programs, particularly in the Third World. Emphasis is on communication interventions in agriculture, health, nutrition, family planning, and community development and especially on methods for designing communication strategies for reaching low-income, rural people. Among the approaches considered are extension, social marketing, and development support communication.

COMM 428 Communication Law
Spring. 3 credits. Limited to juniors, seniors, and graduate students; others by permission of the instructor. Lect. M W F 11:15-12:05. J. Walther. This course deals with the law governing communication media. Topics covered include First Amendment concepts, restraints on newsgathering and dissemination, libel, invasion of privacy, copyright protection, regulation of broadcast and nonbroadcast electronic media, advertising law, and current legal issues unique to online communication.

COMM 440 Advanced Human-Computer Interaction Design (also INFO 440)
Fall. 3 credits. Prerequisite: COMM 240 or COMM 245 or permission of instructor. T R 10:10-11:25. G. Gay and J. Hancock. Focuses on the design of computer interfaces and software from the user's point of view. The goal is to teach user interface designs that "serve human needs" while building feelings of competence, confidence, and satisfaction. Topics include formal models of people and interactions, collaborative design issues, psychological and philosophical design considerations, and cultural and social issues.

COMM 445 Seminar in Computer-Mediated Communication
Spring. 3 credits. Prerequisites: COMM 240 or 245. T R 11:40-12:55. K. McComas. Focuses on reading and evaluating the theories and research methodologies used to investigate communication via computer systems. Assignments include student collaborations using electronic conferencing and other advanced communication technologies, as well as reflections on and evaluations of these collaborations in light of current theories and research findings. Topics include virtual teams, videoconferencing, and others as they emerge.

COMM 450 Language and Technology (also INF 450)
Spring. 3 credits. T R 10:10-11:25. J. Hancock. Examines how new communication technologies affect the ways we produce and understand language and modify interaction with one another. Attention will focus 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 466 Public Communication of Science and Technology (also S AT S 466)
Fall. 3 credits. Limited to 15 students. Prerequisite: COMM 260 or 352, or ENGR 350, or permission of instructor. Offered odd-numbered years. M W 2:55-4:10. B. Lewenstein. Explore the structure, meanings, and implications of "public communication of science and technology" (PCST). Examine the contexts in which PCST occurs, look at motivations and constraints of those involved in producing information about science for nonprofessional audiences, and analyze the functions of PCST. Tie existing ideas about PCST to general communication research, and learn how to develop and disseminate knowledge about PCST. Course format is primarily seminar/discussion.

COMM 476 Communication Fellows Program
Spring. 2 credits. Prerequisites: permission of instructor; limited to communication seniors selected based on goals and academic preparation. M W 2:55-4:10. B. O. Earle. A 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. Fee of $150 charged.

COMM 480 Independent Honors Research in Social Science
Fall or spring. 1-6 credits. Limited to undergraduates who have met the requirements for the honors program. Meeting times TBA. J. Walther. Students who have successfully completed COMM 382 will register for no more than 3 credits. Students who have not completed an advanced research methods course must register for up to 6 credit hours.

COMM 486 Risk Communication
Spring. 3 credits. T R 1:25-2:15; Lab, R 2:30-4:25. C. Scherer. An examination of theory and research related to the communication of scientific information about environmental, agricultural, food, health,
and nutritional risks. Course concentrates on social theories related to risk perception and behavior. Case studies involving pesticide residues, waste management, water quality, environmental hazards, and personal health behaviors are examined. Emphasis is placed on understanding, applying, and developing theories.

**COMM 494 Special Topics in Communication**

Fall, spring, or summer. 1-3 credits variable. S-U grades optional. Prerequisite: permission of instructor. Study of topics in communication not otherwise provided by a department course and determined by the interest of the faculty and students.

**COMM 496 Communication Internship**

2 credits (sec. 1) or 1 credit (sec. 2) Communication majors only. K. Berggren. Students who register for section 1 will receive a structured, on-the-job learning experience under the supervision of communication professionals in a cooperating organization. Requirements include mandatory participation in two pre-internship symposiums (spring semester; will receive an “R” grade) and two post-internship discussions (fall semester) plus a minimum of 120 hours of work experience in communication (summer or fall) and a final paper that analyzes the work experience according to communication theories. The preparatory symposiums and summary evaluation sessions may be done by distance education technologies. The preliminary symposiums may be taken by students who are still seeking a specific internship. Students may register in a subsequent semester for one additional hour (section 2) for an internship with an organization that requires interns to receive academic credit. 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 for section 2. All internships must be approved prior to the work experience segment by the internship coordinator.

**COMM 497 Individual Study in Communication**

Fall or spring. 1-3 credits; may be repeated to 6 credits with a different supervising faculty member. Prerequisite: 3.0 cumulative average. Students must register using an 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. At the end of the term, the student should submit a written report that demonstrates the value and importance of the work performed. The report should be approved by the instructor.

**COMM 498 Communication Teaching Experience**

Fall or spring. 1-3 credits; may be repeated to 6 credits with different courses. Limited to juniors and seniors. Intended for undergraduate desiring classroom teaching experience. Prerequisite: 3.0 cumulative average (2.7 if teaching assistant for a skills development course) and permission of the faculty member who will supervise the work and assign the grade. Students must register using an 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 499 Independent Research**

Fall or spring. 1-3 credits; may be repeated to 6 credits. Limited to seniors and graduate students. Prerequisite: 3.0 cumulative average. Students must register using an 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 610 Seminar in Communication and Social Networks**


**COMM 618 Communication and Persuasion**

Spring. 3 credits. Prerequisite: introductory research methods course and introductory psychology or social psychology course. T R 10:10-11:25. C. Yuan. The course focuses on theories of communication's influence on persuasion and attitude change. Students become familiar with a variety of social-psychological theories of attitude change and persuasion. Those theories are also applied to a variety of communication situations including mass communication, advertising, public relations/public information, and interpersonal communication. Lectures concurrent with COMM 418; graduate students should enroll in COMM 618.

**COMM 621 Advanced Communication and the Environment**

Spring 3 credits. M W 2:25-4:10. Offered odd-numbered years. K. McComas. Students investigate how values, attitudes, social structure, and communication affect public perceptions of environmental risk and public opinion of 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 421; graduate students should enroll in COMM 621.

**COMM 622 Advanced Psychology of Television (and Beyond)**

Fall. 3 credits. Prerequisites: graduate student status and permission of instructor. Meeting times TBA. M. Shapiro. A survey of how people mentally process television and other audiovisual communication technologies—including movies, video games, virtual reality, and the Internet. Topics include: why people watch, what happens mentally when they watch, how people understand and mentally process media, and how media psychologically influence beliefs, attitudes, thinking, and emotion.

**COMM 624 Communication in the Developing Nations**

Fall. 3 credits. Open to juniors, seniors, and graduate students. Lect. T 1:25-2:35; Lab. T 2:30-4:25. J. Hancock. The role of communication in development programs, particularly in Third World nations. Emphasis is on communication interventions in agriculture, health, nutrition, family planning, and community development, and especially on methods for designing communication strategies for reaching low-income, rural people. Among the approaches considered are extension, social marketing, and development support communication. Lectures concurrent with COMM 424; graduate students should enroll in COMM 624.

**COMM 640 Human-Computer Interaction Design (also INFO 640)**

Fall. 3 credits. Prerequisites: graduate standing or permission of instructor. T R 10:10-11:25. J. Hancock. Graduate-level readings and research supplementing COMM 440. This course focuses on the design of computer interfaces and software from the user's point of view. The goal is to teach students 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 645 MC Graduate Seminar**

Spring. 3 credits. Prerequisites: graduate standing or permission of instructor. T R 11:40-1:25. J. Walther and J. Hancock. Graduate-level readings and research supplementing COMM 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 650 Language and Technology**

Fall. 3 credits. T R 11:40-12:55. J. Hancock. Graduate-level readings and research supplementing COMM 450. The course examines how new communication technologies affect the way we produce and understand language and modify interaction with one another. Attention will focus 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 656 Communication Planning for Social and Behavioral Change**


**COMM 660 Studies in Communication**

Fall. 3 credits. Limited to graduate students in communication; others by permission of instructor. M W 8:40-9:55. J. Shanahan. A review of classical and contemporary readings in communication, including key concepts and areas of investigation. An exploration of the scope of the field, the interrelationships of its various branches, and an examination of the role of theory in the research process.
An analysis of the methods used in processing.

Development of, and contemporary issues in, communication theory. Discussion includes the interaction between communication and society, social groupings, and mental processing.

COMM 681 Advanced Communication Theory
Spring, 3 credits. Offered odd-numbered years. Prerequisite: COMM 680 or graduate standing and permission of instructor. M W 2:55-4:10 with additional meetings TBA. M. Shapiro.

An analysis of the methods used in communication research. Emphasis is on understanding the rationale for survey, textual, experimental, and ethnographic research methods. Development of class research project from research question to final report. Computer use of Statistical Package for the Social Sciences (SPSS) to assist in data analysis. Familiarity with basic statistical concepts helpful.

COMM 682 Methods of Communication Research
Spring, 3 credits. Loc, M W F 12:20.
R. Ostman

An examination of the methods related to the communication of scientific information about environmental, agricultural, food, health, and nutritional risks. Course concentrates on social theories related to risk perception and behavior. Case studies involving pesticide residues, waste management, water quality, environmental hazards, and personal health behaviors are examined. Emphasis is placed on understanding, applying, and developing theories of risk communication.

COMM 683 Qualitative Research Methods in Communication

COMM 686 Risk Communication
Spring, 3 credits. T R 1:25-2:15; lab, R 2:30-3:25, C. Sherer.

An examination of the theory and research related to the communication of scientific information about environmental, agricultural, food, health, and nutritional risks. Course concentrates on social theories related to risk perception and behavior. Case studies involving pesticide residues, waste management, water quality, environmental hazards, and personal health behaviors are examined. Emphasis is placed on understanding, applying, and developing theories of risk communication.

COMM 691 Seminar: Topics in Communication
Fall and spring. No credit. S-U grades only.

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 (project) proposals to faculty members and peers.

COMM 694 Special Topics in Communication
Fall, spring, or summer. 1–3 credits variable. S-U grades only. Prerequisite: permission of instructor. Study of topics in communication not otherwise provided by a department course and determined by the interest of faculty members and students.

COMM 698 Seminar in Communication Issues
Fall, spring, or summer. 1–3 credits. Letter grade only. Prerequisite: permission of instructor.

Small group study of theoretical issues in communication not otherwise examined in a graduate field course.

COMM 797 Graduate Independent Study
Fall, spring, or summer. 1–3 credits. Letter grade only. Prerequisite: permission of instructor.

Individual study concentrating on locating, assimilating, synthesizing, and reporting existing knowledge on a selected topic.

COMM 798 Communication Teaching Laboratory
Fall and spring. 1–3 credits each semester. Letter grade only. May be repeated once.

Limited to graduate students. Prerequisite: permission of the faculty member who will supervise the work and assign the grade. Students must use the faculty member's section number to register. Graduate faculty.

Designed primarily for graduate students who want experience in teaching communication courses. Students work with an instructor in developing course objectives and philosophy, planning, and teaching.

COMM 799 Graduate Research
Fall, spring, or summer. 1–3 credits. Letter grade only. Prerequisite: permission of committee chair.

Graduate research individual project for M.S. (Communication) students.

COMM 800 Master's-Level Thesis Research
Fall or spring. 1–6 credits. May be repeated for a maximum of 6 credits. S-U grades only. Prerequisite: permission of committee chair.

Thesis research for M.S. (Communication) students.

COMM 901 Doctoral-Level Dissertation Research
Fall or spring. 1–9 credits. May be repeated for a maximum of 6 credits. S-U grades only. Prerequisite: completion of "A" exam; permission of committee chair.

Dissertation research for Ph.D. candidates.

CROP AND SOIL SCIENCES

Note: class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

Courses by Subject

Crop Science: 311, 312, 314, 315, 317, 415, 444, 455, 608, 610, 612, 613, 614, 642, 691, 820, 920, 921

Environmental Information Science: 398, 410, 411, 420, 456, 485, 486, 620, 660, 675, 694, 860, 960, 961

Soil Science: 200, 260, 363, 365, 372, 373, 412, 421, 467, 471, 472, 473, 483, 621, 663, 666, 667, 669, 671, 672, 693, 880, 980, 981

General Courses

CSS 190 Sustainable Agriculture
Fall. Credits variable. 3 or 4. Limited to 60 students. S-U grades only. Prerequisite: junior standing. M T 2:00-4:25, G. W. Fick and C. J. Peters.

This course is designed to be an enjoyable introduction to basic food production resources (soils, crops, livestock, and climates), and it emphasizes scientific principles of management that conserve or renew those resources for continuing benefit to society. The information is of general value for nonmajors and students new to the field. Laboratories include several field trips and stress hands-on experience with soils, crops, and farms. One extra credit can be earned by participation in team preparation and delivery of a lesson in sustainable agriculture.

CSS 494 Special Topics in Crop and Soil Sciences (undergraduate level)
Fall or spring. 4 credits maximum. S-U grades optional.

The department teaches "trial" courses under this number. Offerings vary by semester, and are advertised by the department before the semester begins. Courses offered under this number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

CSS 497 Individual Study in Crop and Soil Sciences
Fall or spring. 1–6 credits. S-U grades optional. Students must register using an Independent Study form (available in 140 Roberts Hall).

The topics in soil science, crop science, or environmental information science are arranged at the beginning of the term for individual study or for group discussions.

CSS 498 Teaching Experience in Crop and Soil Sciences
Fall or spring. 1–5 credits. S-U grades optional. Students must register using an Independent Study form (available in 140 Roberts Hall).

Teaching experience in soil science, crop science, or environmental information science is obtained by assisting in the instruction of a departmental course.

CSS 499 Undergraduate Research
Fall or spring. Credit TBA. S-U grades optional. Students must register using an Independent Study form (available in 140 Roberts Hall).

Independent research on current problems selected from any phase of crop science or soil science.
CSS 695 Planning and Reporting Research

Spring. 2 credits. First meeting the first T of the semester in 102 Bradford. Next offered spring 2006. G. W. Fick.
New graduate students and students starting to write their theses have found this course very helpful. Topics covered include: scientific writing, reviewing, seminar presentations, and poster presentations. The nature of science and the scientific method are also discussed along with professional ethics in the conduct and communication of science.

CSS 696 Seminar in Crop and Soil Sciences

Fall and spring. 1 credit. S-U grades only.

Seminars cover current research and selected topics in the crop and soil sciences and related fields.

Crop Science

CSS 311 Grains and Nutraceuticals

Fall. 4 credits. Prerequisite: CSS 260 or BIOL 241. Lecs, M W F 10:10; lab, M 1:25-4:25. One or two field trips during lab periods (usually 5 p.m. or on weekends). R. L. Obendorf.

Globally, six seed crops provide 75 percent of the caloric and protein needs of mankind: wheat, rice, maize, soybeans, and roots and tubers. These crops are grown in intensive agriculture systems for improved health. Laboratory uses selected species diversity and domestication, conservation of protein and legume uses, and implications for various kinds of agricultural seeds. Hands-on laboratory experience.

CSS 312 Forage Crops

Spring. 4 credits. Prerequisites: introductory course in crop and/or soil science. Lecs and recitation in animal nutrition. Lecs, M W F 11:15; lab, M or W 1:25-4:25. G. W. Fick.

The production and management of crops used for livestock feed are considered in terms of biotic and abiotic factors, both on-farm and off-farm. Forage crops, forage legumes, and corn are emphasized, and consideration is given to their value as livestock feed in terms of energy, protein, and other nutritional components.

CSS 314 Tropical Cropping Systems: Biodiversity, Social, and Environmental Impacts (also IARD 314)

Fall. 3 credits. Prerequisite: an introductory course in crop science or soil science or biology or permission of instructor. Lecs, T R 8:40-9:55. P. Hobbs.

Characterization and discussion of traditional shifting cultivation; lowland rice-based systems; upland cereal-based systems; smallholder mixed farming including root crops and livestock; plantation fruit and oil crops; and agroforestry. In addition to species diversity and domestication, factors such as climate, land quality, soil management, land tenure, labor, and markets are considered. The impact of tropical cropping systems on the environment are evaluated.

CSS 315 Weed Science

Fall. 4 credits. Prerequisite: introductory course in biology or botany. Lecs, T R 10:10-11:25; lab, T or W 2:00-4:25. A. DiTommaso.

Principles of weed science are examined. Emphasis is on: a) weed biology and ecology; b) weed-management strategies used in agricultural and natural ecosystems; and c) the chemistry of herbicides in relation to effects on plant growth and the environment. Hands-on laboratory sessions cover weed identification and ecology, herbicide application, selectivity, and symptomology.

CSS 317 Seed Science and Technology (also HORT 317)

Fall. 3 credits. Prerequisite: BIOL 241 or equivalent. Lecs, T R 11:15-12:05; lab, R. Two all-day field trips will be scheduled during the semester. Offered alternate years. 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 426 Practicum in Forest Farming as an Agroforestry System (also HORT 426 and NTRES 426)

Fall. 2 credits. Lab, W 1:25-4:25. R. W. Mudge, L. E. Buck, and P. Hobbs.

Students will actively take part in the development and management of a seventy-year-old nut grove originally planted at Cornell in the 1930s. The MacDaniel's Nut Grove is being developed as a multipurpose forest-farming teaching, research, and extension site. Hands-on activities will include all or most of the following: temperate-nut harvest and variety evaluation, mushroom culture, small-fruited and fruit-tree culture, medicinal-herb culture, site evaluation and planning, and field trips to other agroforestry-related sites. Outdoor activities will be integrated with selected readings via an online discussion board.

CSS 444 Integrated Pest Management (also ENTOM 444)

Fall. 4 credits. Prerequisites: one course in biology or permission of instructor. Lecs, M W F 9:05; labs, M 1:25-4:25, J. E. Losey and A. DiTommaso.

Courses integrate the principles of pest control, ecology, and economics in the management of pests across multiple systems. Laboratories consist of exercises to reinforce concepts presented in lecture and demonstrate pest monitoring techniques and the application of computer technology to management problems.

CSS 455 Mineral Nutrition of Crops and Landscape Plants (also MINE 455)

Spring. 3–5 credits. Prerequisite: CSS 260 or BIOL 242, or equivalent. Lecs, M W F 9:05; lab, R 1:30-4:00. Offered alternate years. A. DiTommaso.

A modular course on principles of plant mineral nutrition and nutrient management. A mandatory module on principles is followed by others on mineral nutrition, soil chemistry, floriculture, and fruit crops. Each module carries one credit: a minimum of three credits must be taken in one semester. By the end of the course, students understand the principles of mineral nutrient function in crop plants, and are able to diagnose deficiencies by symptoms and tissue tests and devise organic and conventional nutrient management strategies that maximize productivity and mineral nutrient quality.

CSS 608 Water Status in Plants and Soils

Fall. 1 credit. Prerequisite: permission of instructor. S-U grades only. Lecs, lab, R 1:25-4:25, first class meeting R. Offered alternate years. T. L. Setter.

Covers 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, and abscisic acid analysis with ELISA.

CSS 610 Physiology of Environmental Stresses

Fall. 3 credits. Prerequisite: plant physiology, BIOL 242 or 341, or permission of instructor. Offered every other year. Lecs, M W F 1:25-4:25. T. L. Setter.

A study of the responses of plants to environmental stresses, including chilling, freezing, high temperature, salinity, drought, hypoxia, and toxic elements. Emphasis is on the physiological and biochemical basis of injury and plant resistance mechanisms at the whole-plant, cellular, and molecular levels.

CSS 612 Seed Biology

Spring. 3 credits. Prerequisite: plant physiology, TR 8:30-9:55. R. L. Obendorf.

This course in seed biology 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 613 Physiology and Ecology of Yield

Spring. 3 credits. Prerequisite: plant physiology, M W F 1:25-4:25. T. L. Setter.

A study of environmental constraints on crop productivity from the perspective of key biological processes. Acclimation responses and genetic adaptation are examined for temperature, light, water, compacted soil, and mineral nutrient environments. Topics include photosynthesis and nitrogen assimilation, translocation, and partitioning; canopy-scale influences on solar radiation use efficiency, regulation of growth processes in leaf, root, and floral sinks in response to environment; seed set, water transport and stomatal regulation; root growth in flooded and compacted soils; and drought responses. Emphasis is on growth processes of vegetative plant organs.

CSS 614 Weed Ecology and Management

Spring. 3 credits. Prerequisite: CSS 315 or equivalent. Lecs, T R 10:10-11:25. Offered alternate years. A. DiTommaso.

An examination of plant ecological principles governing weed population dynamics and weed-crop competitive interactions in different crop and noncrop ecosystems. Application of these fundamentals for the development and implementation of environmentally sound and sustainable integrated weed management strategies is explored. 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 642 Plant Mineral Nutrition (also BIO PL 642)]
A detailed study of the processes by which plants acquire and utilize mineral nutrients from the soil. Topics include the uptake, translocation, and compartmentation of mineral elements; root-soil interactions; metabolism of mineral elements; the involvement of mineral nutrients in various physiological processes; and nutrition of plants adapted to extreme environmental stresses (e.g., acid soils). Specific mineral elements are emphasized to illustrate the above topics.

[CSS 691 Special Topics in Crop Science]
Fall or spring. 1-6 credits. S-U grades optional. Staff. Study of topics in crop science that are more specialized or different from other courses. Special topics to be offered depend on staff and student interests.

[CSS 820 Master’s-Level Thesis Research in Crop Science]
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students specifically in a master’s program.

[CSS 920 Graduate-Level Thesis Research in Crop Science]
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students admitted for candidacy. After the “A” exam has been passed.

Environmental Information Science

[CSS 398 Environmental Microbiology (also BIOMI 398)]
Spring. 3 credits. Prerequisite: BIOEE 261 or BIOMI 260 or CSS 260 or permission of instructor. Offered alternate years. Not offered in 2005. Lect. M W F 10:10-11:00. E. L. Madsen. The biology, behavior, and function of microorganisms in natural environments are discussed in relation to past and present environmental conditions on Earth. The role of microorganisms in ecologically and environmentally significant processes is also considered through discussion of specific topics such as elemental cycles, nutrient cycling, transformation of pollutants, wastewater treatment, and environmental biotechnology.

[CSS 410 Environmental Impact of Agricultural Technology]
Spring. 3 credits. Prerequisite: BIO G 109 or equivalent. Lect. M W 12:25-1:15; lab, W 2:30-4:25. Staff. Outlines how changes in agricultural practice associated with the introduction of genetically modified (GM) crops might impact the environment. Current knowledge of the different kinds of environmental problems caused by some GM crops will be discussed, as well as the principles and questions that have emerged from studies of environmental impact so far.

[CSS 411 Resource Inventory Methods (also CEE 411)]
Spring. 3 credits. Prerequisite: permission of instructor. Lect. M W 9:05-9:55; lab, M R 1:25-4:25. A. Lembo. A survey of resource inventory methods applied to field-based studies of environmental systems. Laboratory emphasis is on using maps, spatial databases, global positioning systems, and aerospace imagery to discriminate, measure, inventory, and monitor environmental resources.

[CSS 420 Geographic Information Systems]
Fall. 4 credits. Prerequisite: CSS 411 or permission of instructor. Lect. T R 9:05-9:55; lab, T 10:10-11:10; M W R F 1:25-4:25. A. Lembo. Principles and applications of geographic information systems for the characterization and assessment of agronomic and environmental resources. Methods for accessing, updating, analyzing, and mapping spatial data and information are emphasized. Needs assessment, coordinate systems, database design and maintenance, data transformations, and map accuracy assessment are considered.

[CSS 455 Global Positioning System]
Fall and spring. 1 credit. Prerequisite: CSS 411 or CSS 420, or equivalent, or consent of instructor. Offered the last five weeks of the semester. Lect. F 1:25-4:25. A. Lembo. Introduction to navigation-grade GPS instruments used in agricultural and environmental science. Topics include instrument familiarization, field-data collection and processing, real-time and post-differential correction, and GPS-GIS integration.

[CSS 485 Problem Solving in Environmental and Agroecosystem Science]
Fall. 4 credits. Prerequisite: CSS 260 or equivalent. Limited to seniors. Lect. 1st meeting F 1:25; lab, at least one 4-hour afternoon per week plus additional time as needed. P. Ravey. Capstone experience for seniors, centering on the problem-solving 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. This course involves field trips, in-depth discussions of data assembled prior to the course, gathering of relevant scientific information (in groups), and report writing. Students will be 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 486 Problem Solving in Environmental and Agroecosystem Science III]
Spring. 4 credits. Prerequisite: CSS 485. Limited to seniors. Lect. TBA; lab, at least one 4-hour afternoon per week plus additional time as needed. P. Ravey. Capstone experience for seniors, in continuation of CSS 485. 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 620 Spatial Modeling and Analysis]
Spring. 3 credits. Prerequisites: CSS 420, CSS 461, or permission of instructor. Lect. T R 9:05-9:55; lab, T W 1:25-4:25. A. Lembo. Theory and practice in the development, integration, and visualization of spatial data for resource inventory, environmental process modeling, land classification, and evaluation. Application and evaluation of advanced spatial analytical methods applied to environmental systems and databases of interest to the student are emphasized.

[CSS 660 Remote Sensing Fundamentals (also CEE 610)]
Fall. 3 credits. Prerequisite: permission of instructor. Lect. M W 12:20-1:10; lab, F 12:20-1:10. 1:25-2:15. W. D. Philpot. An introduction to equipment and methods used in obtaining information about earth resources and the environment from aircraft or satellite. Coverage includes sensors, sensor and ground-data acquisition, data analysis and interpretation, and project design.

[CSS 675 Modeling the Soil-Plant-Atmosphere System (also EAS 675)]
Spring. 3 credits. Prerequisite: CSS 483 or equivalent. Offered alternate years. Next offered spring 2006. Lect. T R 8:40-9:55. S. J. Riba. Introduction to the structure and use of soil-plant-atmosphere models. Topics covered 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. Use of soil-plant-atmosphere models for teaching, research, extension, and policy formation are discussed.

[CSS 694 Special Topics in Environmental Information Science]
Fall or spring. 1-6 credits. S-U grades optional. Staff. Study of topics in environmental science that are more specialized or different from other courses. Special topics to be offered will depend on staff and student interests.

[CSS 860 Master’s-Level Thesis Research in Environmental Information Science]
Fall or spring. Credit by arrangement. S-U grades only. Graduate faculty. Limited to students specifically in a master’s program.

[CSS 960 Graduate-Level Dissertation Research in Environmental Information Science]
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students in a Ph.D. program only before the “A” exam has been passed.
The principles for field identification of soil properties, profiles, and landscapes are presented. A series of soil pits are examined, described, classified, and interpreted in the field.

CSS 363 Soil Genesis, Classification, and Survey
Fall. 4 credits. Prerequisite: CSS 260, Lecs, M W F 1:15-1:25. Lab, W 1:25-4:25. One all day field trip is required. J. Russell-Anelli.

Factors and processes of soil formation on which soil survey is based are discussed. Principles of field identification, classification, survey, and interpretation are practiced in a field setting. An overview of soil databases, their content, development, and use for site evaluation and land classification is provided.

CSS 365 Environmental Chemistry: Soil, Air, and Water
Spring. 3 credits. Prerequisites: CHEM 207-208, Lecs, M W F 10:10-11:00. M. B. McHirtle.

An overview of the chemical processes that control the concentrations and bioavailability of nutrients and pollutants in soil, air, and water. Particular attention is given to soil's function as a filter for contaminants. The history of environmental contamination and its impact on agricultural soils and ecosystems is described.

CSS 372 Nutrient Management in Agro-Ecosystems
Spring. 4 credits. Prerequisite: CSS 260 or permission of instructor. Lecs, T R M 4:40-5:55; lab, R 1:25-4:25. J. Lehmann.

Students become familiar with the basic concepts of soil 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 agro-ecosystems. Emphasis placed on how nutrient management can be improved without creating environmental hazards. Students have hands-on training in analytical procedures and expand knowledge in discussion moderated through oral as well as poster presentations. Graduate students should enroll in CSS 472.

CSS 412 Whole Farm Nutrient Management (also AN SC 412)
Spring. 2 or 4 credit option. Open to juniors, seniors, and graduate students only. Course offered as two modules. Enrollment in Module 1 for the first half of the semester is required (2 credits). Module 1 consists of crop and manure nutrient management planning; no prerequisites for CASL students. Enrollment in Module 2 for the second half of the semester is optional (additional 2 credits). AN SC 411 required. Lecs, T R 11:15 and lab T 1:25-4:25 for both modules, with work on case studies outside of lab. M. E. VanAmburgh, Q. M. Ketterings, and G. L. Albrecht.

This course provides students with an understanding of the concepts underlying whole farm nutrient management planning to improve soil fertility while protecting water and air quality. Students learn and apply concepts in the development of a Comprehensive Nutrient Management Plan (CNMP) that is required for a Concentrated Animal Feeding Operation (CAFO) to meet environmental regulations. 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 (Program 3). Students opting to continue through the end of the semester in Module 2 (4 credit option) build upon knowledge gained in the first half of the semester by learning the knowledge and skills necessary to interpret crop production and herd feeding management for reducing nutrient imports on farms.

CSS 421 Soil and Water Management
Fall. 4 credits. Prerequisites: CSS 260, S-U grades optional. Lecs, R 11:40-12:55; lab, R 2:30-4:30. H. M. van Es.

Introduces students to the principles of soil and water management and to the effects of human intervention on these processes. Aspects of soil and water management, including hydrology, soil erosion and conservation, water management, contaminant movement, tillage, soil compaction, and water quality are examined. Case studies and policy approaches from both the United States and abroad are discussed.

CSS 466 Soil Ecology (also HORT 466)
Spring. 4 credits, with laboratory. Prerequisite: one year of biology or ecology with one of CSS 260 or permission of instructor. Lecs, T R 10:10-11:25; lab, W 1:25-4:25. J. E. Thies and I. Drinkwater.

Discover the wonder of life underground. In this course, you will study the amazing diversity of soil organisms along with their functions and interactions in terrestrial ecosystems.
CSS 472 Nutrient Management and Research in Agro-Ecosystems  
Spring. 4 credits. Prerequisite: CSS 260 or permission of instructor. Lecs, TR 8:40-9:55; lab, R 1:25-4:25. J. Lehmann.  
Students become familiar 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 agro-ecosystems. Emphasis is placed on the way nutrient management can be improved without creating environmental hazards. Students have hands-on training in analytical procedures and expand knowledge in discussion groups and through oral as well as poster presentations. The laboratory experiments conclude with a final paper.

CSS 473 Ecology of Agricultural Systems (also BIOEE 473)  
Fall. 3 credits. Limited to 45 students. Prerequisite: BIOEE 261 or permission of instructor. S-U grades optional. Lect and disc, TR. During the first 6 weeks of class, the Thursday meetings may run to 5:30 because of field trips. TR 2:30-3:45. Not offered fall 2004-2005. A. G. Power and E. C. Fernandes.  
Analysis of the ecological processes operating in agricultural systems, with an emphasis on the interactions between organisms. Topics include nutrient dynamics in agroecosystems, plant competition and facilitation, intercropping, the ecology of species invasions, mutualism in agroecosystems, plant-herbivore relations, plant-pathogen interactions, nutrient cycling, and evolution of invasive species. Applications to pest control and evolutionary processes in agriculture. Case studies from both the tropics and the temperate zone are used to illustrate important concepts.

CSS 483 Environmental Biophysics (also EAS 483)  
Spring. 3 credits. Prerequisite: CSS 260 or equivalent or permission of instructor. Offered alternate years. Lecs, M W F 11:15. S. J. Riba.  
Introduction to basic principles of energy and mass transfer and storage in soil-plant systems. Energy budgets; soil heat flow; water movement in saturated and unsaturated soils; evapotranspiration; and water, gas, and nutrient dynamics in the soil-plant-atmosphere continuum are covered. Applications to agronomic and environmental problems and instrument design and use are considered through discussion and problems sets.

CSS 621 Applications of Space-Time Statistics  
Spring. 2 credits. Prerequisite: STBTRY 601 or equivalent. S-U grades only. Offered alternate years. Offered after spring break 2005. M W F 2:30-4:25. H. Van Es.  
An introduction to space-time statistics with applications in agriculture and environmental management. Topics include geostatistics (including use of ArcView's Geostatistical Analyst), temporal statistics, sampling, experimental design, state-space analysis, data mining, and fuzzy logic. The focus is on landscape-scale processes and a user's perspective.

CSS 663 Pedology  
Spring. 3 credits. Prerequisite: CSS 361 or permission of instructor. M W F 11:15-12:05. S-U grades only. Not offered 2005. J. Russell-Anelli.  

CSS 666 Applied Plant-Microbe Interactions  
Fall. 4 credits. Prerequisite: CSS 466 or equivalent, or permission of instructor. Lecs, T R 10:10-11:25; lab, F 1:25-4:25. Offered alternate years. Not offered fall 2004. J. E. Thies.  
This discussion and laboratory-based course focuses on the nature of microbial interactions with plants, concentrating largely on bacterial and fungal associations. Symbiotic associations and pathogenic interactions are all investigated. Improving professional practice, within the content area, is a main aim of this subject. Students learn to examine the primary literature, present research reports, write and refine research proposals, conduct a small independent-research project, and report on the outcomes in conference and journal formats. Class discussions explore the nature of the rhizosphere environment as a habitat for microorganisms, the physiology of the organisms residing there through readings in the primary literature. In laboratory, all students conduct an independent research project, aligned with their interests, in which they develop testable hypotheses and conduct experiments using relevant, modern methods.

CSS 667 Advanced Soil Physics  
Spring. 3 credits. Prerequisite: one year of college physics and CSS 483 or permission of instructor. S-U grades optional. Offered alternate years. M W F 11:15-12:05. P. C. Baveye.  
This course is meant to acquaint students to advanced topics in soil physics in a number of areas, including the statics and thermodynamics of soil water, the physics of swelling-shrinking soils, the transport of water and solutes in heterogeneous soils, the measurement of soil physical parameters, and the effect of spatial/temporal heterogeneity of soils on their physical characteristics. The format of the course, based in most part on weekly, individual tutorials, allows different topics to be covered, depending on the interest(s) of the students. If a group of students expresses interest in it, the course can also involve reflection on the detailed design of one or more laboratory or field experiments related to soil physics.

CSS 669 Organic Matter—Soils, Sediments, and Waters  
Spring. 3 credits. Prerequisite: CSS 260 and CHEM 357-358 or equivalent. M W F 10:10-11:00. J. M. Duxbury.  
A discussion of current concepts on the chemical nature, dynamics, and properties of natural organics and organo-mineral associations in terrestrial and aquatic environments. Includes a modeling project of soil carbon dynamics in natural or agricultural ecosystems.

CSS 671 Soil Chemistry  
Fall. 3 credits. Prerequisite: one year of physical chemistry or permission of instructor. Lecs, M W F 10:10. Offered alternate years. M. B. McBride.  
A detailed examination of the structure and surface chemistry of colloidal particles common to soils. Ion exchange; mineral-solution equilibria; and adsorption reactions of silicate clays, oxides, and organic matter are emphasized. The behavior of environmental contaminants in soils, particularly metals and toxic organics, is described.

CSS 672 Nutrient Cycling in Natural and Managed Ecosystems  
Fall. 3 credits. Prerequisite: CSS 372 or NTR 321 or BIOEE 478, or permission of instructor. Lecs, T R 10:10-11:00; lab, F 1:25-4:25. J. Lehmann.  
Nutrient cycling in soil and the interface between the soil and the vegetation, atmosphere, and ground water are covered. We examine 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 693 Special Topics in Soil Science  
Fall, spring, or summer. 1–6 credits. S-U grades optional. Study of topics in soil science that are more specialized or different from other courses. Special topics to be covered will depend on staff and student interests.

CSS 696 Seminar: Organic Inputs in Tropical Soils and Agroforestry (also NTR 696 and IARD 696)  
Fall, spring. 1 credit Section 2. S-U grades only. Lecs, T R 12:10-1:20; E. Fernandes and L. Fisher.  
A variety of speakers present seminars on organic inputs in the tropics and agroforestry. Students are required to prepare a synopsis of each seminar.

CSS 880 Master's-Level Thesis Research in Soil Science  
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students specifically in a master's program.

CSS 980 Graduate-Level Dissertation Research in Soil Science  
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students in a Ph.D. program only before the "A" exam has been passed.

CSS 981 Doctoral-Level Dissertation Research in Soil Science  
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students admitted to candidacy after the "A" exam has been passed.
DEVELOPMENT SOCIOLOGY


Note: the prefixes for courses in this department were listed as R SOC in previous years.

Note: class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

D SOC 101 Introduction to Sociology
Fall, spring, or summer. 3 credits
Enrollment limited to 300 students in the fall, 400 in the spring. Lecs, T R 10:10-11:00, sec, various times. Fall, T. Hirschl; spring, staff.

This course provides an introduction to theory and research in sociology. It demonstrates how the insights, theories, and methods of sociological analysis can be brought to bear on major issues of social life. A primary goal is to convey a sense of the manner in which sociologists formulate theories and how the collection and analysis of data are used to evaluate those theories. The course provides "hands-on" experience in analyzing sociological issues. Students undertake guided research exercises that involve using computers to analyze actual data. No prior background is presumed; necessary skills are covered in class and section meetings.

[D SOC 103 Self and Society (also SOC 103)]

D SOC 112 Development Sociology First-Year Writing Seminar
Fall, spring. 3 credits. Lec.; M W 2:55-4:10. R. Kreider.

In this course we read three contemporary novels to examine the dynamic link between the 'self' and society. These novels are juxtaposed with sociological writings to examine how the narratives can confirm, challenge, or refute sociological concepts such as identity, gender, race, community, and social/economic exclusion.

D SOC 175 Issues in Contemporary American Indian Society (also AIS 250)

This course addresses major U.S. policies affecting American Indians in the twentieth century, and ways in which American Indians pursued strategies to sway the process of social change. American Indian political, economic, and cultural issues are examined through history, literature, music/art, and film/documentary. The approach of this course is interdisciplinary and an emphasis is placed on the study of American Indians as living cultures. Current trends are discussed, and the implications for American Indians in the twenty-first century are explored. Guest lecturers, including American Indian scholars, leaders, and activists, provide additional perspectives.

[D SOC 200 Social Problems (also SOC 200)]

D SOC 201 Population Dynamics (also SOC 202)
Spring. 3 credits. S-U optional. Enrollment limited to 25 students. ALS students must register for this course as D SOC 201. T R 2:55-4:10. L. Williams.

This course provides an introduction to population studies. After reviewing basic concepts and demographic principles and techniques, the course focuses on how demographic processes (fertility, mortality, and migration) affect social and economic outcomes. Discussions cover special topics related to population growth and distribution, including mass education, marriage and family formation, labor force participation, inequality and poverty, women's status, resource allocation, and the environment.

D SOC 205 International Development (also SOC 206)
Spring. 3 credits. Enrollment limited to 74 students. M W F 10:10-11:00. P. McMichael.

New questions concerning development models in the post-Cold War era are examined 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, Western sociocultural (economies, ecologies, class/gender relations) and the impact of global forces on Southern resources. Such forces include global food systems, new forms of export production, development agencies, multilateral institutions, local bureaucracies, transnational corporations, the debt crisis, and new technologies.

Also examined are the new global justice movements, such as environmentalism, feminism, and landless workers, peasant, and grass-roots activism.

D SOC 206 Gender and Society (also FGSS 206)
Spring. 3 credits. Enrollment limited to 100 students. Lecs. M W 11:15-12:05; sec, various times. Staff.

Course familiarizes students with the origins of gender hierarchies, social behavioral similarities/differences between females and males, and the degree that biological, psychoanalytic, psychological and sociological perspectives help to understand the differences. United States and cross-cultural comparisons of the consequences of gender inequality are a major focus of the course. Objectives are met through lectures, readings, films, participant observation, and personal experiences.

[D SOC 208 Technology and Society]

D SOC 210 Race in America and at Cornell (also GOVT 210)
Fall. 3 credits. Offered alternate years (complement of D SOC 214). T R 11:40-12:55. P. Eloundou-Enyegue.

A survey of definitions of social indicators and general principles of social indicators research is illustrated from data on both developed and less-developed countries. Data management and analysis of measures of poverty, level of living, inequality, quality of life, and so on, based on census data, household surveys, and key-informant and other low-cost techniques, are examined using personal computers.

[D SOC 214 Research Methods for the Social Sciences]

D SOC 215 Introduction to Organizations (also SOC 215)

D SOC 220 Sociology of Health of Ethnic Minorities (also LSP 220)
Fall. 3 credits. S-U optional. Enrollment is limited to 15 students. T R 10:10-11:25. J. A. Parra.

Discusses the health status of minorities in the United States. This course 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.

[D SOC 261 Sociology of Sustainable Development]

D SOC 275 Immigration and a Changing America

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 twentieth century and shows no signs of diminishing in the twenty-first 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 how the new immigrants are, why they come to America, where they live, and what roles they fill in America.

D SOC 301 Theories of Society (also SOC 375)

D SOC 302 Evaluating Statistical Evidence (also SOC 301)
Fall. 4 credits. S-U option. Lec.; M W 11:15-12:05. S. Szelenyi.

A first course in statistical evidence in the social sciences, with emphasis on statistical inference and multiple regression models. Theory is supplemented with numerous applications.

D SOC 305 Education, Inequality and Development

Spring. 3 credits. Letter grade. Prerequisite: introductory social science course or permission of instructor. T R 10:10-11:00. P. Eloundou-Enyegue.

Improvements in formal schooling are often advocated as solutions for a variety of socioeconomic problems in nonindustrial and industrial nations alike. This course
critically assesses human capital approaches to development. Topics include 1) the variety and functions of school systems, 2) the individual and macro-level determinants of educational and socioeconomic stratification, 4) the effects of education on development, and 5) tools for evaluating education projects.

D SOC 311 Social Movements (also AIS 311 and LSP 311)
Spring. 3 credits. Prerequisites: D SOC 101, SOC 101 or permission of instructor. S-U grades optional. T R 1:25-2:40. A. Gonzales.
Social movements are collective efforts by relatively powerless groups of people to change society. Typically conceptualized as political activity outside the institutional framework, social movements are politics by other means. This course examines the transnational dimensions of social movements to assess the implications of globalization for political mobilization and the ways that social movement actors engage global political process to effect social change. Under what circumstances do movements emerge? How do global processes shape both domestic and transnational political mobilization? How do movements internally organize and choose political tactics and strategies to achieve their goals? How have social movements changed over time? This course examines these questions through an examination of indigenous peoples movements in the United States, Canada, and Latin America.

D SOC 318 Ethnohistory of the Northern Iroquois (also AIS 318)
Fall or spring. 3 credits. Enrolment limited to 100 students. T R 2:55-4:10. C. Geisler.
The main objective of the course is to develop a critical understanding of the dominant trends in modern U.S. environmental thought, like preservationism, conservationism, deep ecology, sociocultural theories of NIMBYism, risk assessment, ecological modernization, and environmental equity. Another objective is to familiarize students with some major contemporary substantive environmental problems and policies. These topics include air and water quality, public lands management, biodiversity, deforestation, climate change, and ozone depletion. A sociological framework is applied to evaluate relationships of substantive and philosophical/theoretical issues.

D SOC 320 Genomics and Society
This course analyzes the changing structure and role of small towns and rural areas in developed nations. The focus is 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. Alternative policies to ameliorate rural problems and/or enhance rural contributions to national development are considered. Students participate in group research projects in rural communities.

D SOC 340 Sociology of Food Systems
Spring. 3 credits. T R 1:25-2:40. G. W. Gillespie.
Our changing food and agricultural systems are examined sociologically, with attention to how these reflect the social organization of an increasingly global society. This course addresses such questions as: What are the major trends? What drives them? What do these trends imply for people, communities, and the environment? What are the social, human-health, and environmental issues? What might be better alternatives and what strategies of development might achieve them?

D SOC 354 Sociology of Contemporary Culture (also S&T 354 and SOC 552)
Fall. 4 credits. M W F 11:15-12:05. C. Leuenberger.
This course introduces students to the rapidly expanding body of work at the intersection of sociology, cultural studies, and science and technology studies. It provides an introduction to theoretical debates in cultural studies and to sociological studies of culture. We discuss the emergence of the tourist industry; the significance of consumption and advertisements in modern life; the cultures of music, art, and television, the use of rhetoric in politics and science; cultural and feminist analyses of knowledge, science, and technology; as well as the social construction of self, bodies, and identities.

D SOC 355 Latinos, Law, and Identity
(also LSP 355 and AM ST 357)
Spring. 3 credits. Prerequisite: D SOC 101 or permission from instructor. Letter only. M W F 11:15-12:05. R. L. Mize.
Critical exploration of the critical-justice movement and Latina/o identities. Legal cases, federal and state laws, and constitutional issues that impact Latina/os residing in the United States are highlighted. Theoretical contributions of law and society, critical race theory, LatinCrit, and outsider-jurisprudence perspectives applied to historical precedent and current attempts at marginalizing/empowering Latina/o communities.

D SOC 360 Sociology of American Indians
(also AIS 361)

D SOC 367 American Indian Politics and Policy
(also AIS 367)

D SOC 370 Comparative Issues in Social Stratification (also SOC 371)
Fall. 3 credits. Prerequisite: an introductory social science course. T R 8:40-9:55. S. Feldman.
This course reviews both classical and contemporary issues in the comparative social stratification literature. Particular attention is given to the changing configurations of different labor markets, debates on the meaning of new economic constituencies, and the role of gender, race, ethnicity, and sexuality in assessing the patterns, meaning, and experiences of inequality. Throughout the course special attention is given to the importance of understanding how questions of measurement are constructed and employed in understanding social inequality.

D SOC 375 Comparative U.S. Racial and Ethnic Relations
(also AM ST 375)
Fall. 3 credits. Prerequisite: D SOC 101 or permission from instructor. Letter only. M W F 11:15-12:05. R. L. Mize.
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. Critical interrogation of whiteness and ethnic identities. Focus 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.

D SOC 380 Independent Honors Research in Social Science
Fall and spring. 1-6 credits. Limited to students who have met the requirements for the honors program. A maximum of 6 credits may be earned in the honors program. J. Francis.
Students should select a faculty adviser 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.

D SOC 410 Health and Survival Inequalities (also SOC 410)
Historical and contemporary health inequalities and survival continue to exist today. This course covers some of the markers of such inequalities, including region, class, race, gender, and age, and examines some of the biological, socioeconomic, and political determinants of these differences. Macro as well as individual and family-level determinants are examined. Policy prescriptions are evaluated and new innovative approaches proposed.

D SOC 418 Population Policy (also B&S SOC 414)

D SOC 421 Theories of Reproduction (also SOC 421)
Examines the contentious debate on 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.

D SOC 430/629 Human Migration: Internal and International

D SOC 431/631 Comparative Ethnic Stratification: Demographic Perspectives
Spring. 3 credits. S-U grades optional. Prerequisite: Intro to Sociology or permission of instructor. T R 11:40-12:55. D. Gurak.
A comparative examination of ethnic stratification and mobility that focuses principally on dimensions of social groups that can be empirically measured using readily available demographic sources. These include residential segregation, occupational status and mobility, marriage and family formation, patterns, health and mortality, family structure, mobility, and intermarriage. The role of migration in shaping ethnic stratification systems is also examined. About half of the course examines the U.S. situation. Other societies receiving significant attention include...
India, Brazil, Nigeria, and several European societies. For D SOC 631, graduate students will also meet with the instructor every other week to discuss graduate readings and topics relevant to their papers.)

D SOC 435/635 Indigenous Peoples and Globalization (also AIS 435/635)
Fall. 3 credits. Limited to 23 students.
Explores ways in which processes of globalization affect indigenous peoples worldwide and the strategies indigenous peoples are using to deal with these pressures. Globalization, whether under the auspices of the World Trade Organization and regional economic agreements such as the NAFTA or the de-agrarianization of the social and political arrangements contemporaneous with modernization or the expansion of communication technology and its impact on traditional knowledge systems, has had profound social, cultural, and economic impacts on indigenous peoples. At issue are the lands, resources, traditional knowledge, intellectual and cultural property, and indigenous struggles for recognition and self-determination.

D SOC 437 Aging and Aging Social Policy in the 1990s
D SOC 438/638 Population and Development
Fall. 3 credits. S-U grades optional.
Prerequisite: permission of instructor. T R 11:40-12:55. D. Gurak.
Examines major historical and recent demographic transitions in mortality, fertility, age structure, and composition, and explores the relationships between these transitions and the social, or economic, and cultural changes being experienced by diverse societies prior to, during, and following the onset and conclusions of the demographic shifts. Case studies from diverse historical periods and geographic locations are used. Graduate students also meet with the instructor every other week to discuss graduate readings and topics relevant to their papers.

D SOC 494 Special Topics in Development Sociology
Fall or spring. 3 credits maximum. S-U grades optional.
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.

D SOC 495/695 Population and Development in Sub-Saharan Africa
D SOC 497 Independent Study in Development Sociology
Fall or spring. 3 credits variable (may be repeated for credit). Students must register using an Independent Study form (available at 140 Roberts Hall). S-U grades optional.
Informal study may include a reading course, research experience, or public service experience.

D SOC 560 Managing Local Environmental Systems: Social Perspectives and Research Bases
Fall. 3 credits. W 1:25-4:25. J. Francis.
Course is for students with diverse backgrounds: undergrads, grads, people in professional careers, others with interesting environmental-issue identification, resolution, and management. Course discussions include ecological, social, economic, and local government perspectives. Via lab exercises throughout the semester, students have opportunities to apply the concepts and principles of these perspectives to analysis of specific local environmental-management problems. Readings, lectures, and a course project are mandatory.

D SOC 601 Theoretical and Methodological Approaches to Community and Rural Development
Fall. 3 credits. Letter grade only.
Prerequisite: graduate student. Lec, W 7:30-10:00 P.M. P. Eberts.
A survey of three general approaches for conducting analysis and practice in community and rural development. These approaches include examinations of: 1) community structural changes and policymaking; 2) participatory processes for generating community development; and 3) planning strategies as mechanisms for creating community development opportunities.

D SOC 602 Community Development Seminar
Spring. 1 credit. Prerequisite: D SOC 601.
Letter only. W 7:30-10:00 P.M. P. Eberts.
A participatory seminar for feedback, collective learning, and guidance as M.P.S. students apply community and rural development theory and methods in the thesis project work with local and regional communities.

D SOC 603 Classical Sociological Theory
Fall. 4 credits. Prerequisites: open to graduate students only. R 1:25-4:25.
M. J. Pfeiffer.
Students review 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 of the course 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.

D SOC 606 Sociological Theories of Development
Spring. 3 credits. T 2:30-5:30. Staff.
This course is a critical examination of a historical range of theories and research in the sociology of development from the post-war 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.

D SOC 607 Sociology of Natural Resources and Development (also ASIAN 603)
D SOC 608 Demographic Techniques (also PAM 606)
Fall. 3 credits. Prerequisite: multivariate statistics or permission of instructor. S-U grades optional. W 4:30-7:30 P.M. D. Gurak or K. Joyner.
This course provides an introduction to the methods, measures, and data used in the analysis of human populations. Topics include demographic rates, life-table analysis, cohort vs. period analysis, survival vs. availability of demographic data, population estimation and projection, and stable population models.

D SOC 611 Globalization and Social Movements
D SOC 612 Population and Development in Asia (also FGSS 612)
D SOC 615 Qualitative Research Methods
Fall. 3 credits. Letter grades only.
Lec, T 1:25-4:25. L. Williams.
This seminar introduces students to a number of qualitative methods of field research in the social sciences. We discuss field observation, archival research, in-depth individual interviews, and focus group interviews. We assess 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), choice of questions, and issues of validity and reliability. Ethical considerations are highlighted.

D SOC 617 Foundations in Social Research: Comparative Epistemologies
Fall. 3 credits. Letter grades only.
This seminar is 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. Both positivist and non-positivist approaches are examined. The relationship of quantitative and qualitative methodologies are related to different epistemologies.

D SOC 618 Research Design I
D SOC 619 Quantitative Research Methods
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. Introduction to logistic regression and some nonlinear models. Special attention is given to handling ordered and unordered categorical data as these are prevalent in social demographic data sets. Data from real surveys like the American National Election Studies and the General Social Surveys will be analyzed using programs like SAS and SPSS. Includes labs and writing projects to analyze these data. Students familiarize themselves with data cleaning, missing data estimation, transformations, subsetting, and other data handling procedures.
D SOC 620 Sociology of the Community
Fall. 3 credits. W 1:25-4:25. 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 test the assumptions driving the methods and analysis of both contemporary and historical research.

[D SOC 621 Foundations of Environmental Sociology]
[D SOC 625 State, Economy, and Society]
[D SOC 630 Field Research Methods and Strategies]
[D SOC 640 Community and Changing Property Institutions]
[D SOC 641 Politics and Economics of Rural and Regional Development Fall. 3 credits. Prerequisite: upper-level or graduate students only. M 12:20-2:50. T. A. Lyson. A survey of social, political, and economic factors in local and regional development. Theories of community and regional development and underdevelopment are explored. Neoclassical, Marxist, and civil society theories are examined within local and global contexts.]
[D SOC 643 Land Reform Old and New]
[D SOC 645 Rural Economy and Society]
[D SOC 655 Advanced Techniques of Demographic Analysis]
[D SOC 661 Sustainable Agriculture and Development Spring. 3 credits. W 1:25-4:25. T. A. Lyson. This course examines the relationship between local agriculture and development as these are embedded in a globalizing economy.
[D SOC 666 Genomics, Agriculture, Food Systems, and Development]
[D SOC 671 Epistemological Challenges to Social Science Paradigms: A Feminist Inquiry (also FGSS 671)]
[D SOC 675 Global Patterns of International Migration]
[D SOC 694 Special Topics in Development Sociology Fall or spring. 4 credits maximum. S-U grades optional. 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.
[D SOC 715 Comparative Research Methods]
[D SOC 718 Multidimensional Measurement and Classification]
[D SOC 719 Logistic and Log Linear Models]
[D SOC 725 Theories of State, States of Theory Spring. 5 credits. W 1:25-4:25. S. Feldman. This course examines how processes of political, economic, and social restructuring reshape state capacities and processes of state formation. The animating question: How have new patterns of "globalization"—transnational corporatist alliances, social movements, and new hegemonic relations—altered how we understand the meanings, activities, and power of rule? Critical to these discussions are the fundamentalisms as these emerge and reconfigure national, regional, and global alliances and practices, as well as the reification of current processes of resistance, change, and terms of intervention and exchange. The course engages historical, poststructural, postcolonial, and comparative theories particularly as these have emerged and been refined by current debates in South Asia, Latin America, and Africa.
[D SOC 730 Sociology of Global Change Fall. 3 credits. R 1:25-4:25. P. D. McMichael. Analyses of social change and development are increasingly sensitive to global context. They include the sociology of the world economy as a multilayered entity anchored in an evolving international division of labor and the systems, nation states, and the sociology of transnational political, economic, and cultural processes (e.g., food regimes, commodity chains, diasporas and transnational identities, and reconfiguration of localizing). The seminar examines the substantive and methodological questions more sensitive to global processes, including questions of relevant units of analysis, situating global processes in local contexts and vice versa, and examining the ways in which national structures and cultures interact with global structures and cultures.
[D SOC 791 Teaching Experience Fall or spring. 1-3 credits. Limited to graduate students. S-U grades only. Graduate faculty. Participation in the ongoing teaching program of the department.
[D SOC 800 Master's-Level Thesis Research Fall or spring. Credit TBA. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty. For students admitted specifically to a Master's program.
[D SOC 872 Development Sociology Limited to master's and doctoral degree candidates with permission of the graduate field member concerned. S-U grades optional. Graduate faculty.
[D SOC 900 Graduate-Level Thesis Research Fall or spring. Credit TBA. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty. For students in a Ph.D. program only before the "A" exam has been passed.

Related Courses in Other Departments
(Others may be added)
Population Dynamics (SOC 205)
Gender Relations, Gender Ideologies, and Social Change (FGSS 524)

Summer Session Courses
Social Movements (three-week session)

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 240, 322, and 351. EAS 322 and 351 may also be used to fulfill requirements of the Geological Sciences major. 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. The EES program is administered by Cornell Abroad. For further information on the EES program see www.geo.cornell.edu/geoLOGY/classes/hawaii/course.html.
General Courses

EAS 121 Introduction to Computer Programming
Fall. 2 credits. Prerequisites: MATH 111, 112 (Corequisite). D. Schwartz

EAS 151 FORTRAN Applications in Earth Science
Spring. 2 credits. Prerequisite: CIS/EAS 121 or equivalent. Letter grade only. Lee, T R 9:05-9:55, lab, T 12:55-3:25, A. J. Pershing. This seven-week course emphasizes the application of computing in the Earth sciences, including data processing and modeling of the Earth, its atmosphere, and oceans. This course extends the procedural programming concepts developed in CIS 121. EAS 121 and considers their implementation in high-performance, compiled languages. Topics include the structure and syntax of a FORTRAN program, data input/output, compilation, and debugging.

EAS 240 Field Study of the Earth System
Spring. 5 credits. Prerequisites: one semester of calculus (MATH 190/191/192 or MATH 111/112) and two semesters of any of the following: PHYS 207/208 or 112/213; CHEM 207/208; BIO G 101-103-102/104 or 105/106 or 109/110. Lec, M T W R F 7:00 A.M.-7:00 P.M. A. Moore and M. Wysoki. This is an interdisciplinary field course covering fundamental concepts of the Earth system. Topics include global circulation patterns in the solid Earth, atmosphere and oceans, and their transfer; change and variability of Earth’s atmosphere and ocean systems; the temporal record of change preserved in the geologic record; Earth/ocean/atmospheric controls on ecosystems processes. The course is project-based with students engaged in hands-on, active learning that takes advantage of local resources in Hawaii.

EAS 322 Biogeochemistry of the Hawaiian Islands
Spring. 4 credits. Prerequisites: BIOEE 261 or EAS 321 or EAS 455 or permission of instructor. Lec, M T W R F 9:00-5:00. T. Derry. A field-oriented study of biogeochemical processes and ecosystem interactions across the Hawaiian Islands. Field, class, and laboratory work will focus on how landscape age and climate strongly control biogeochemical cycling and ecosystem development in Hawaii. Other topics include succession of ecosystems, evolution of nutrient cycles, and impacts of invasive species. The class will be structured around field projects, carried out both as groups and individually.

EAS 351 Marine Ecosystems Field Course
Spring. 4 credits. Prerequisite: one semester of biology, one year of calculus; EAS 194 or 349, or permission of instructor. Lec, M T W R F 9:00-5:00. C. Greene and B. Monger. This field course will cover the interactions of physical and biological processes in marine ecosystems. It will start by looking at these processes on ocean basin to regional scales and work down to the smaller scales relevant to individual organisms. Students will be 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 in Hawaii.

EAS 496 Internship Experience
Fall or spring. 1-2 credits. S-U grades only. Staff.

EAS 498 Teaching Experience in Earth and Atmospheric Sciences
Fall, spring. 1-4 credits. S-U grades only. Students must register using an Independent Study Form. Staff. The student assists in teaching an EAS course appropriate to his/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 131 Basic Principles of Meteorology
Fall. 3 credits. Lec, M W F 9:05. M. W. Wysocki. A simplified treatment of the structure of the atmosphere: heat balance of the Earth; general and secondary circulations; air masses, fronts, and cyclones; hurricanes, thunderstorms, tornadoes, and atmospheric condensation. In the laboratory, emphasis is on techniques of analysis of weather systems.

EAS 133 Basic Meteorology Lab
Fall. 1 credit. Prerequisite: concurrent enrollment in EAS 131. T W R 12:25-1:25 or M W 7:00-9:30, M. W. Wysocki. Laboratory course covering topics presented in EAS 131.

EAS 250 Meteorological Observations and Instruments
Fall. 3 credits. Prerequisite: EAS 131. Lec, M W 12:20, lab, R 1:25. M. W. Wysocki. This course covers methods and principles of meteorological measurements and observations including surface, free-air, and remote systems. Also covered are: instrument sting, mounting, and protection; instrument response characteristics, calibration, and standardization; recorders and data logging systems. Laboratory exercises are in observation and data analysis. The course is intended to serve as preparation for Observers Examination. Lab fee $50.

EAS 268 Climate and Global Warming
Spring. 3 credits. Prerequisite: basic college math, S-U grades optional. Lec, M W F 10:10-11:00. A. T. DeGaetano. Students from a range of disciplines become familiarized with such contemporary issues in climatology as global warming and El Niño. Introductions to the natural greenhouse effect, past climates, and observed and projected climate changes and impacts. Also natural climate variations (e.g. El Niño) and their consequences and predictability. Weekly student-led discussions of issues appearing in journals such as Nature.

EAS 296 Forecast Competition
Fall and spring. 1 credit. S-U grades only. Prerequisite: sophomore undergraduate standing in atmospheric science, or permission of instructor. D. S. Wilks. This two-semester course provides daily exercise in professional forecasting, in which students compete to forecast local weather most skillfully. Enroll for two consecutive semesters, with credit awarded after the second semester. May be repeated for credit.

EAS 331 Climate Dynamics (also ASTRO 331)
Fall. 4 credits. Prerequisites: two semesters of calculus and one semester of physics. Lecs, M W F 12:20-1:10; disc, T 1:25-2:15. K. H. Cook and P. J. Gierasch. Processes that determine climate and contribute to its change are discussed, including atmospheric radiation, ocean circulation, and atmospheric dynamics. Contemporary climate change issues are investigated and discussed in the context of natural variability of the system.

EAS 334 Microclimatology
Spring. 3 credits. Prerequisite: A course in physics. T R 10:10-11:25. Offered alternate years. Next offered 2006. S. J. Riba and D. S. Wilks. The relationships 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 341 Atmospheric Thermodynamics and Hydrostatics
Fall. 3 credits. Prerequisites: one year of calculus and one semester of physics. M W F 9:05-9:55. 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 covered include thermodynamic processes of dry air, water vapor, and moist air, and concepts of hydrostatics and stability.

EAS 342 Atmospheric Dynamics (also ASTRO 342)
Spring. 3 credits. Prerequisites: one year each of calculus and physics. Lecs, M W F 10:10-11:00. K. H. Cook and P. J. Gierasch. An introduction to the basic equations and techniques used to understand motion in the atmosphere, with an emphasis on the space and time scales typical of storm systems (the synoptic scale). The governing equations of atmospheric flow are derived from first principles and applied to middle latitude and tropical meteorology. Topics include balanced flow, atmospheric waves, circulation, and vorticity.

EAS 352 Synoptic Meteorology I
Spring. 3 credits. Prerequisites: EAS 341 and concurrent enrollment in EAS 342. Lecs, T R 9:05; lab, M 1:25. M. W. Wysocki. Weather map analysis and forecasting techniques are studied from the principles of fluid and heat flow. This course 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 435 Statistical Methods in Meteorology and Climatology
Fall. 3 credits. Prerequisites: one introductory course each in statistics (e.g., AEM 210) and calculus. T R 10:10-11:25. D. S. Wilks. Statistical methods used in climatology, operational weather forecasting, and selected meteorological research applications. Includes some statistical characteristics of
metereological data including probability distributions and operational structures. Covers operational forecasts derived from multiple regression models, including the MOS system. Also covers forecast verification techniques and scoring rules, time series analysis, EOFs, and other research topics as time permits.

[EAS 447 Physical Meteorology]
Fall. 3 credits. Prerequisites: one year each of calculus and MWP 9:05–9:55. Offered alternate years; next offered 2005. A. T. DeGaetano.
Primarily a survey of natural phenomena of the atmosphere, with emphasis on their underlying physical principles. Topics include composition and structure of the atmosphere; atmospheric optics, acoustics and electricity; microphysical cloud processes; and principles of radar probing of the atmosphere.

[EAS 451 Synoptic Meteorology II]
Spring. 3 credits. Prerequisites: EAS 451 and 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 at these scales. Laboratory 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 456 Mesoscale Meteorology]
Fall. 3 credits. Prerequisites: EAS 451 and S. J. Colucci. Structure and dynamics of midlatitude mesoscale weather systems such as fronts, jet streams, 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 457 Atmospheric Air Pollution]
Fall. 3 credits. Prerequisites: EAS 341 or one course in thermodynamics, and one semester of chemistry, or permission of instructor. M W F 9:05–9:55. Offered alternate years; next offered 2006. S. J. Colucci. Structure and dynamics of midlatitude mesoscale weather systems such as fronts, jet streams, 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 483 Environmental Biophysics (also CSS 483)]
Spring. 3 credits. Prerequisite: EAS 341 or EAS 342. Course covers quasigeostrophic theory, atmospheric waves, hydrodynamic stability, the general circulation of the atmosphere, and other topics selected from among numerical weather prediction and tropical, mesoscale, and middle atmosphere processes according to student interest.

[EAS 487 Introduction to Radar Remote Sensing (also ECE 487)]
Fall. 3 credits. Prerequisite: PHY 208 or equivalent, or permission of instructor. T R 10:10–11:25. Offered alternate years. D. L. Hysell.
Course 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 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 will be able to take the course. Emphasis placed on radar applications in geophysics, meteorology and atmospheric sciences, and astronomy and space science.

[EAS 494 Special Topics in Atmospheric Science (undergraduate level)]
Fall or spring. 8 credits maximum. S-U grades optional. Staff.
The department teaches "trial" courses under this number. Offered by semester, and are advertised by the department before the semester starts. The course is not offered more than twice.

[EAS 497 Individual Study in Atmospheric Science]
Fall or spring. 1–6 credits. S-U grades optional. Students must register using an Independent Study form. Staff.
Topics are arranged at the beginning of the term for individual study or for group discussions.

[EAS 499 Undergraduate Research in Atmospheric Science]
Fall or spring. Credit by arrangement. S-U grades only. Students must register using an Independent Study form. Staff.
Independent research on current problems in atmospheric science.

[EAS 652 Advanced Atmospheric Dynamics (also ASTRO 652)]
Spring. 3 credits. Prerequisites: EAS 341 or equivalent. T R 11:40–12:55. Offered alternate years. S. J. Colucci and P. J. Gierasch.
Course covers quasigeostrophic theory, atmospheric waves, hydrodynamic stability, the general circulation of the atmosphere, and other topics selected from among numerical weather prediction and tropical, mesoscale, and middle atmosphere processes according to student interest.

[EAS 666 Applied Multivariate Statistics]
Spring. 3 credits. Prerequisite: EAS/CSS 483 or equivalent. T R 8:30–9:55. Offered alternate years; next offered 2006. S. J. Riha.
Statistical techniques for multivariable data. Topics include multivariate exploratory data analysis, the multivariate normal distribution, parametric and nonparametric inference about multivariate means, principal component analysis, canonical correlation analysis, discriminant analysis, and cluster analysis. Geophysical applications are emphasized, primarily using atmospheric and oceanographic data as examples, but the development is general enough to be of broader interest.

[EAS 675 Modeling the Soil-Plant-Atmosphere System (also CSS 675)]
Fall or spring. 1–6 credits. S–U grades optional. Hours by arrangement. S-U grades only. Staff.
Introduction to the structure and use of soil-plant-atmosphere models. Topics covered 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. Use of soil-plant-atmosphere models for teaching, research, extension, and policy formation is discussed. (Course covers quasigeostrophic theory, atmospheric waves, hydrodynamic stability, the general circulation of the atmosphere, and other topics selected from among numerical weather prediction and tropical, mesoscale, and middle atmosphere processes according to student interest.)

[EAS 692 Special Topics in Atmospheric Science]}
Fall or spring. 1–6 credits. S–U grades optional. Staff.
Study of topics in atmospheric science that are more specialized or different from other courses. Special topics to be covered depend on staff and student interests.

[EAS 711 Upper Atmospheric and Space Physics]}
Fall or spring. Credit by arrangement. S–U grades only. Hours by arrangement. S–U grades only. Graduate faculty.
Limited to students specifically in the master's program in atmospheric science.

[EAS 850 Master's-Level Thesis Research in Atmospheric Science]}
Fall or spring. Credit by arrangement. S–U grades only. Hours by arrangement. Graduate faculty.
Limited to students specifically in the master's program in atmospheric science.

[EAS 950 Graduate-Level Dissertation Research in Atmospheric Science]}
Fall or spring. Credit by arrangement. S–U grades only. Hours by arrangement. Graduate faculty.
Limited to students in the atmospheric science Ph.D. program only before the “A” exam has been passed.

**EAS 951 Doctoral-Level Dissertation Research in Atmospheric Science**
Fall or spring. Credit by arrangement. S-U grades optional. Hours by arrangement. Graduate faculty.
Limited to students admitted to candidacy in the atmospheric science Ph.D. program after the “A” exam has been passed.

**Geological Science**

**EAS 101 Introductory Geological Sciences**
Fall. 3 credits. T R 11:15–12:05. Staff. Designed to enhance an appreciation of the physical world. Natural environments, surface temperatures, dynamic processes such as mountain belts, volcanoes, earthquakes, glaciers, and river systems are emphasized. Interactions of the atmosphere, hydrosphere, biosphere, and lithosphere (Earth System Science) are covered. Water, mineral, and fossil resources and environmental concerns are also examined. Field trips in the Ithaca region.

**EAS 102 Evolution of the Earth and Life (also BIO G 170)**
Spring. 3 credits. Lecs., T R 9:05–9:55 or 11:15–12:05; labs, T W or R 2:00–4:25. J. L. Cisne.
This course covers: Earth systems and their evolution; Earth history's astronomical context; plate tectonics, continental drift, and their implications for climate and life; coevolution of life and the atmosphere; forerunners for ongoing global change; and dinosaurs, mass extinctions, and human ancestry. Includes laboratories on reconstructing geological history and mapping ancient geography and fossil-collecting field trips.

**EAS 103 Science of Earth Systems (SES) Freshman Colloquium**
Fall. 1 credit. Lec. F 2:30–3:20. Staff. Students meet weekly to discuss topics in the science of Earth systems and develop skills that will help them meet their academic and career goals. Topics will include an overview of the Science of Earth Systems, the various areas of study open to students in this major, possible career paths, and active areas of research. Study, computer, and research skills useful for SES students will be reviewed, along with opportunities for working in earth system-related areas. The colloquium will include guest speakers and several field trips.

**EAS 107 How the Earth Works**
A user-friendly introduction to the workings and interactions of solid Earth, ocean, atmosphere, and life as they relate to understanding ongoing global change.

**EAS 108 Earth in the News**
Summer. 3 credits. S. L. Losh.
Provides an 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.

**EAS 109 Dinosaurs**
Fall. 1 credit. Lecs., T W or R 12:20–1:10. J. L. Cisne.
An introductory survey course for anyone interested in dinosaurs. Lectures examine the fossil evidence and illustrate how various geological and biological disciplines contribute to understanding dinosaurs and their world.

**EAS 111 To Know the Earth**
Fall. 3 credits. Lecs., T R 10:10–11:25. Staff. Acquaints the nonscientist with Earth, its major features, how the Earth has evolved, Earth system science, and holding a habitable planet. Covers the effects of human activity on geologic environments, mitigating environment damage, and living with natural hazards. Also covers mineral resource use in the twenty-first century and an environmentally sound fossil-fuels-minerals cycle.

**EAS 122 Earthquake! (also ENGR 122)**
Spring. 3 credits. Lecs., T R 1:25–2:40. I. D. Hirn.
The science of natural hazards and strategic resources is explored. 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 154 The Sea: An Introduction to Oceanography—Lecture (also BIOEE 154)**
Spring, summer. 3 credits. The optional one-credit laboratory for this course is offered as EAS/BIOEE 155. S-U grades optional. Lecs., T R 11:40–12:55. Spring, T R 1:25–2:40.
C. H. Greene, W. M. White; summer, B. C. Mungor.
A survey of the physics, chemistry, geology, and biology of the oceans for both science and non-science majors. Topics include seawater properties, and tides; ocean circulation; ocean floor; and sediment processes.

**EAS 155 The Sea: An Introduction to Oceanography—Laboratory (also BIOEE 155)**
Laboratory course covering topics presented in EAS/BIOEE 154.

**EAS 200 Art, Archaeology, and Analysis**
An interdisciplinary course on the use of techniques of science and engineering in cultural research. Applies physical and physiological principles to the study of archaeological artifacts and works of art. Covers historical and technical aspects of artistic creation. Includes analyses by modern methods to deduce geographic origins, and for exploration, dating, and authentication of cultural objects. Does not meet liberal studies distribution requirement for engineering.

**EAS 201 Introduction to the Physics and Chemistry of the Earth (also ENGRD 201)**
Fall. 3 credits. Prerequisites: PHYS 112 or 207 Lecs., T R 10:10–11:00, lab. R 2:00–4:25 or W 7:30–9:55. L. M. Cathles and J. Phipps Morgan.
This course covers: formation of the solar system; accretion and evolution of the Earth; the rock cycle: radioactive isotopes and the geological time scale; plate tectonics, rocks and minerals, earth dynamics, mantle plumes; the hydrologic cycle: runoff, floods and sedimentation, groundwater flow, and contaminant transport; and the weathering cycle: chemical cycles, CO_2 (weathering), controls on global temperature (CO_2 or ocean currents), and oil and mineral resources.

**EAS 210 Introduction to Field Methods in Geological Sciences**
1 lec, Saturday field trips. 3 credits. Prerequisite: EAS 101 or EAS 201 or permission of instructor. R. Allmendinger.
Considers methods by which rocks are used as a geological database. Covers field methods used in the construction of geologic maps and cross sections; systematic description of stratigraphic sections. Field and laboratory sessions meet on Saturdays until Thanksgiving. There is also one additional lecture during most of these weeks. There is one weekend field trip to eastern New York.

**EAS 213 Marine and Coastal Geology**
Summer. 4 credits. Prerequisite: an introductory course in geology or biology, or permission of instructor. Staff.
A special two-week course offered at Cornell's Shools Marine Laboratory (SML), on an island near Portsmouth, New Hampshire. For more details, including estimated cost and an application, contact the SML office, G14 Stimson Hall, or visit www.sml.cornell.edu.

**EAS 302 Evolution of the Earth System**
Spring. 4 credits. Prerequisite: MATH 112 or 192 and CHEM 207 or equivalent. Lecs., M W F 10:10–11:00, disc., W 2:30–3:20. W. White and staff.
Co-evolution of life and the Earth system: Earth's early history; plates, continental drift, and climate changes during the past billion years; mountain building, ice ages, and our own emergence during the past ten million years. Introduction to methods of interpreting information preserved in the rock record.

**EAS 315 Geomorphology**
Fall. 4 credits. Prerequisite: one course in either geology, hydrology, or soil science. Lecs., T R 8:40–9:55; lab, M 2:00–4:25. Two Saturday field trips. B. I. Isacks.
A study of the processes that sculpt the Earth's landscapes (above and below sea level) and the nature of those landforms. Landforms constructed by Earth's internal processes are the point of departure, as we examine their modification by physical interaction with the atmosphere and oceans. Also treated are depositional landforms that are generated by accumulations of grains or sediment. Laboratory exercises include both field methods and computer analysis of satellite images and Digital Elevation Models of examples from around the globe.
EAS 321 Introduction to Biogeochemistry (also NTRES 321)
Fall. 4 credits. Prerequisites: CHEM 207, MATH 112, plus one course in biology and/or geology. Lecs, T R 12:00-1:10; disc, W 2:00-4:25. L. A. Derry and J. Yavitt. Control and function of the Earth's global biogeochemical cycles. The course 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, bioactive metals, the use of isotope tracers, and mathematical models. Interactions between global biogeochemical cycles and other components of the Earth system are discussed.

EAS 326 Structural Geology
Spring. 4 credits. Prerequisite: one semester calculus plus an introductory geology course, or permission of instructor. One weekend fieldtrip. Lecs, M W F 11:15-12:05, lab, T 2:00-4:25. R. W. Allmendinger. Nature and origin of deformed rocks at microscopic to macroscopic scales, with emphasis on structural geometry and kinematics. Topics include stress, strain, rheology, deformation mechanisms, minor structures, faulting, and structural families.

EAS 355 Mineralogy
Fall. 4 credits. Prerequisite: EAS 101 or 201 and CHEM 207. Lecs, T R 10:10-11:25; lab, W 2:00-4:25. S. Mahlburg Kay. Examination of minerals by hand-specimen properties and optical microscopy. Geological setting, classification, crystal structures, phase relations, chemical properties, and physical properties of minerals are covered. X-ray diffraction is introduced. Includes an independent research project.

EAS 356 Petrology and Geochemistry
Spring. 4 credits. Prerequisite: EAS 355. Lecs, T R 12:20-1:35; lab, W 2:00-4:25. R. W. Kay. Principles of phase equilibrium as applied to igneous and metamorphic systems. Description, classification, chemistry, origin, regional distribution, and dating of igneous and metamorphic rocks. Geochemical distribution of trace elements and isotopes in igneous and metamorphic systems. Also covers the petrological evolution of the planets.

EAS 375 Sedimentology and Stratigraphy
Fall. 4 credits. Prerequisite: EAS 101 or 201. Lecs, M W F 11:15-12:05, lab, T 2:00-4:25. J. L. Cisne. Covers formation of sedimentary rocks, depositional processes and environments; correlation of strata in relation to time and environment; petrology of sandstones and limestones; geological age determination; reconstruction of paleogeography and interpretation of Earth history from stratigraphic evidence and organization of strata in stratigraphic sequences.

EAS 389 Geophysics and Geotectonics
Spring. 4 credits. Prerequisites: MATH 192 or (112) and PHYS 208 or 213. Lecs, M W F 12:20-1:10; lab, M 2:00-4:25. B. L. Isacks. 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 401 Fundamentals of Energy and Mineral Resources
Spring. 3 credits. Prerequisites: math through differential equations, physics through and Magnetism. CHEM 207, or equivalent. Recommended: introduction to geology. L. M. Cathles. Fossil fuels will continue to be the prime source of energy for the foreseeable future, and society depends upon mineral resources. This course describes and quantitatively analyzes energy and mineral resources on the earth. The distribution and nature of earth resources are described, focusing on U.S. examples. Quantitative tools are then developed and used to understand the processes that accumulate resources to economic levels.

EAS 417 Field Mapping in Argentina
Summer. 3 credits. Prerequisites: EAS 210 and 325; Spanish desirable, but not required. S. Mahlburg Kay. Modern techniques of geological mapping applied in the region of San Juan, Argentina, including folded and faulted sedimentary rock units of the Andean Precorriñera (San Juan River section), intensely deformed Proterozoic metamorphic rocks of the Punpane Ranges (Pie de Palo), and shallow-level silicic intrusives (Cerro Blanco-Ullan).

EAS 424 Reflection Seismology
Fall. 3 credits. Prerequisites: MATH 192 and PHY 208, 213, or equivalent. Lecs, T R 1:25-2:40; labs, TBA. 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 software from LandMark.

EAS 437 Geophysical Field Methods (also ARKEO 437)
Fall. 3 credits. Prerequisites: PHYS 213 or 208, or permission of instructor. Alternate years. Not offered 2004-2005. L. D. Brown. Introduction to field methods of geophysical exploration, especially as applied to environmental issues. Emphasis is on seismic, ground penetrating radar, gravity, and magnetic techniques. Field surveys carried out at the beginning of the semester are analyzed and interpreted.

EAS 445 Introduction to Groundwater (also BEE 471 and CEE 431)
Spring. 3 credits. Prerequisite: MATH 293, fluid mechanics or hydrology course. Lec, T R 10:10-11:25. T. S. Steenhuis and E. M. Cathles. Intermediate-level study of aquifer geology, groundwater flow, and contamination of aquifers and cleanup methods. Includes description of transport of pesticides, nutrients and toxic through the unsaturated zone and aquifers. Theoretical and practical applications are discussed. Short field trips are included.

EAS 453 Advanced Petrology
Fall. 3 credits. Prerequisite: EAS 356. Offered alternate years. Next offered 2005-2006. R. W. Kay. Magmas and metamorphism in the context of plate tectonics. Major and trace element chemistry and phase petrology as monitors of the creation and modification of igneous rocks. Temperature and stress in the crust and mantle and their influence on reaction rates and textures of metamorphic rocks. Application of experimental studies to natural systems.

EAS 454 Advanced Mineralogy
Spring. 3 credits. Prerequisite: EAS 355 or permission of instructor. Offered alternate years. S. M. Kay.

EAS 455 Geochemistry
Fall. 4 credits. Prerequisites: CHEM 207 and MATH 192 or equivalent. Recommended: EAS 356. Offered alternate years. Next offered 2005-2006. W. M. White. The Earth from a chemical perspective. Covers the formation of the elements; cosmochemistry; chemical evidence regarding the formation of the Earth and solar system; trace-element geochemistry; isotope geochemistry; geochronology; thermodynamics and kinetics; chemical evolution of the crust, mantle, and core; weathering and the chemistry of natural waters; chemical of rivers and the oceans; hydrothermal systems; and ore deposition.

EAS 458 Volcanology

EAS 460 Late Quaternary Paleogeology
Fall. 3 credits. Prerequisites: one or more of the following: introductory geology, introductory archaeology, and introductory ecology. Lec, two 50-minute meetings per week; lab, 2.5-hour lab per week. M. Goman.
This course explores topics in late Quaternary palaeoecology. The course is broadly divided into three sections: 1) introductory topics; 2) research techniques; and 3) field- and lab-based research.

EAS 462 Marine Ecology (also BIOEE 462)  
Fall. 3 credits. Limited to 75 students. Prerequisite: BIOEE 261. Offered alternate years. Lec, M W F 11:15-12:05. 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, including polar seas, temperate coastal waters, and tropical coral reefs.

EAS 475 Special Topics in Oceanography  
Fall, spring, summer. 2-6 credits, variable. Prerequisites: one semester of oceanography and permission of instructor. Fall, spring: C. H. Greene; summer: B. C. Monger. Undergraduate instruction and participation in advanced areas of oceanographic research. Topics will change from term to term. Contact instructor for further information.

EAS 476 Sedimentary Basins: Tectonics and Mechanics  
Fall. 3 credits. Prerequisite: EAS 375 or permission of instructor. Offered alternate years. T. E. Jordan. Subsidence of sedimentary basins from the point of view of plate tectonics and geomechanics. Course covers interactions of subsidence, sediment supply, and environmental characteristics in development of stratigraphic sequences. Also covers stratigraphic characteristics of active-margin, passive-margin, and cratonic basins. Geophysical and stratigraphic modeling; sequence stratigraphy. Uses modern and ancient examples.

EAS 478 Advanced Stratigraphy  
Fall. 3 credits. Prerequisite: EAS 375 or permission of instructor. Offered alternate years. Next offered 2005-2006. T. E. Jordan. Course covers modern improvements on traditional methods of 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. Physical correlation, dating techniques, and time resolution in sedimentary rocks are considered as are physical controls on the stratigraphic record and numerical modeling.

EAS 479 Paleobiology (also BIOEE 479)  
Fall. 4 credits. Prerequisites: one year of introductory biology and BIOEE 274 or 373 or EAS 575, or permission of instructor. Lec, T R 10:10-11:25; lab, W 2:00-4:25. Offered alternate years. Not offered 2004-2005. W. M. Allmon. A survey of 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 481 Senior Survey of Earth Systems  
Spring. 3 credits. Limited to seniors majoring in geological science. Not offered 2004-2005. Staff. A survey course that integrates undergraduate course work, intended to enhance overall understanding of geological sciences. Emphasis is on current models of Earth's dynamic systems (e.g., global climate change: mantle evolution). Utilizes guest lectures, synthesis and review of literature; scientific literature readings; discussions; and student presentations.

EAS 491-492 Undergraduate Research  
Fall, spring. 1 to 4 credits. Staff. Introduction to the techniques and philosophy of research in geological sciences and an opportunity for undergraduates to participate in current faculty research projects. Topics chosen in consultation with, and guided by, a faculty member. A short written report is required, and outstanding projects are prepared for publication.

EAS 500 Design Project in Geohydrology  
Fall, spring. An alternative to an industrial project for M.Eng. students choosing the geohydrology option. May continue over 2 or more semesters. L. M. Cathles. The project must address one of the many aspects of groundwater flow and contamination, and must involve a significant geologic component and lead to concrete recommendations or conclusions of an engineering nature. Results are presented orally and in a professional report.

EAS 502 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, 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 512 Advanced Structural Geology I  
Spring. 3 credits. R. W. Allmendinger. Stress-strain theory and application. Advanced techniques of structural analysis. Topics include finite and incremental strain measurement: microstructure, preferred orientation, and TEM analysis; and pressure solution and cleavage development; and experimental deformation. Applications to deformation of regional and Proterozoic rocks. Kinematic analysis of shear zones and folds in these regimes.

EAS 524 Advanced Structural Geology II  
Spring. 3 credits. Prerequisites: EAS 326 and permission of instructor. Offered alternate years. R. W. Allmendinger. Geometry, kinematics, and mechanics of structural provinces. Concentration is on thrust belts, orogenic belts, or strike-slip provinces. Covers techniques of balanced cross sections.

EAS 528 Geology of Orogenic Belts  
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 2004-2005. Staff. A seminar course in which students study specific geologic topics of an orogenic belt selected for study during the term.

EAS 534 Advanced Geophysics I  
Fall. 3 credits. Prerequisite: EAS 388 or permission of instructor. Not offered 2004-2005.

EAS 536 Advanced Geophysics II: Quantitative Geodynamics  
Spring. 3 credits. Prerequisite: EAS 388 or permission of instructor. TBA. J. Phinney Morgan. Stress and strain in the Earth, elasticity and flexure, heat transfer, gravity, fluid mechanics, rock rheology, faulting, chemical geodynamics, flow in porous media.

EAS 611 Analysis of Biogeochemical Systems  
Spring. 3 credits. Prerequisite: MATH 293 or permission of instructor. Offered alternate years. T. A. Derry. Covers dynamics of biogeochemical systems; genetic 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 modeling software such as Stella II and MATLAB; and applications to current research of participants or from recent literature.

EAS 656 Isotope Geochemistry  
Spring. 3 credits. Open to undergraduates. Prerequisite: EAS 455 or permission of instructor. Offered alternate years. W. M. White. Nucleosynthetic processes and the isotopic abundance of the elements. Geochronology and cosmochemistry using radioactive decay schemes, including U-Pb, Rb-Sr, Sm-Nd, K-Ar, U-series isotopes, and cosmogenic isotopes such as 14C and 3Cl. Use of radiogenic and stable isotopes in petrology and their application to study of the evolution of the crust and mantle. Isotopic evidence regarding the formation of the Earth and the solar system. Stable isotopes and their use in geothermometry, ore petrogenesis, paleontology, and the global climate system.

EAS 695 Computer Methods in Geological Sciences  
Fall, spring. 3 credits. L. Brown and B. L. Ibsen. Independent research projects using modern computational resources in the Department of Earth and Atmospheric Sciences. Possibilities include: image and seismic processing, seismic and geomechanical modeling, GIS; use of interpretational workshops for 3-D seismic and satellite imagery; modeling fluid flow through complex media.

EAS 700-799 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 term to term. Contact appropriate professor for more information.

EAS 722 Advanced Topics in Structural Geology  
R. W. Allmendinger.

EAS 731 Planetary Geodynamics, Active Tectonics, Volcanology, Earthquakes, and Geodesy  
M. Pritchard.
EDUC 100.2 Writing Through Action: Scholarly Discourse in the University
Fall, spring. 3 credits. Disc, T R 10:10-11:25. C. Shaefer.

The challenge for this highly interactive course is to create a model community of inquiry within which we can explore the links between research, writing, and thinking in the university. Readings will introduce fearless explorers and careful scholars of digital discourse and action research whose work like challenges the status quo of academic culture. Their respective views of educational transformation and its associated issues of validity, property, space, reality, community, power, and identity will inform our own writing about the future of knowledge making. For more information see http://ca-ed100.com.

EDUC 100.3 Re-creating the World: Education and Social Change

How do we build respectful, just, democratic communities in which all can participate and flourish? How do we help others participate in such change processes? Through a cooperative inquiry process, we explore the work of educators and community organizers, including Dewey, Freire, Hooks, Horton, Shor, and Baker, and critically examine our own experiences as members of a powerful social and institutional community: the American university.

EDUC 115 Introductory College Mathematics
Fall. 4 credits. M W F 11:15-12:05; labs, TBA, S. Piliero.

Designed for students wishing to fulfill distribution requirements and/or prepare for study in calculus. This course offers a multi-representational approach to college-level precalculus mathematics, stressing conceptual understanding, problem solving, and applications in a technology-enhanced environment. Considerable emphasis is placed on numerical, graphical, and symbolic representations of functions and their transformations. Students use graphing calculators in a collaborative lab setting. EDUC 115 will not count toward graduation credit in the College of Arts and Sciences.

EDUC 120 Education for Empowerment

Common themes running through the modules include human learning, teaching strategies, and political/social/economic factors affecting education. The course provides an opportunity to sample different areas of study and to gain knowledge and awareness of one's own educational processes.

EDUC 151 Engaging Diversity: Multicultural Issues in Education and Society
Fall or spring. 3 credits. S-U grades optional. T R 12:25-2:40. S. K. Kroma.
The course explores diversity issues that affect students: for example, race, culture, gender, and class in the context of modern American society. Through selected readings and course activities, students recognize the strengths of a diverse community and acquire the knowledge and skills necessary for living and working in it. The focus is on critical thinking about the differences in our society, and the strategies we need for cross-cultural interactions.

EDUC 211 Psychological Foundations of Education
Spring and fall. 3 credits. Limited to 20 students. S-U option available. Prerequisite: introductory psychology. W 2:00-4:25 plus other times THA.

A lecture/discussion survey of the psychological foundations of educational practice. Topics include the selective contributions of developmental, social, and experimental psychology, including instructional technology, to American education.

EDUC 220 Community Learning and Service Partnership (CLASP)

In this service-learning course, students partner with Cornell service workers to accomplish a variety of learning goals selected by the employees. In addition to facilitating adult learning, students critically observe their own experiential learning. Class discussions focus on interpersonal communication, diversity, empowerment, and critical reflection. For the fourth credit, students agree to provide additional service through GLASP.

EDUC 240 The Art of Teaching

The Art of Teaching is an exploratory course designed for students of all backgrounds and interests who have a desire to learn more about 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. This course is designed to guide students in reflecting upon their experiences to help them better understand the decisions they make as teachers. Students have the opportunity to pursue their own interests through a teaching fieldwork assignment. Possible field experiences range from large group to tutorial situations, from preschool to adult education, from traditional school subject matters to recreational and vocational areas, and from school-based to nonformal situations. The course work and readings are designed to build on these experiences throughout the semester and provide concepts and skills to apply in the field.
EDUC 271 Social and Political Context of American Education  
Fall. 3 credits. Disc. TR 1:25-2:40.  
J. W. Sipple  
This course examines the goals, roles, inputs, and outcomes of schooling in American society and the policy environment in which schools operate. We analyze controversies and tensions (e.g., equity, market forces, state control, public education at local, state, and federal levels. The course will include current and historical, urban and rural issues and problems.

EDUC 317 Psychology of Adolescence  
Spring. 3 credits. Prerequisite: Introductory psychology. S-U grades optional. TR 11:15-12:05; F morning section TBA. Not offered 2004-2005. D. E. Schrader  
This course surveys the nature of adolescent cognitive, social, moral, and self-development. Theories of adolescence are examined in the context of real-life experiences of adolescents using case analysis as a methodological tool. Educational implications are discussed for both formal and informal settings.

EDUC 331 Careers in Agriculture, Extension, and Adult Education  
Fall. 1-3 credits. Letter grade only. F 1:25-4:20; 2:00-4:25. G. J. Applebee  
This course offers modules in three areas of teaching: adult education, cooperative extension, and agricultural education. Each module offers one hour of credit, and students may take one or more of the modules. The course provides an historical perspective and an introduction to the organization and scope of programs for each module. Students examine career opportunities and characteristics of the professions addressed by each module. Course activities include field observations and experiences during arranged times.

EDUC 332 Instructional Methods in Agricultural Science Education  
Spring. 1-3 credits. Prerequisite: enrollment in a Cornell teacher education program or permission of instructor. R 2:00-4:25. Not offered 2004-2005. W. Camp  
Selection, practice, and evaluation of methods in agricultural science education are stressed. The course offers an opportunity to explore teaching strategies and methodology unique to teaching agriculture, mathematics, or science and develop their skills and knowledge as teachers through furthering their study of the processes of learning, planning (in relation to state and national standards), assessment, and teaching. Forty hours of fieldwork is required.

EDUC 405 Learning and Teaching I  
Spring. 4 credits. Prerequisite: Admission to Cornell Teacher Education Program, or permission of instructor. Letter grade. Lec., TR 8:40-9:55, F. Fieldwork, TBA. D. E. Schrader  
This course is designed to foster development of pedagogical and reflective understandings crucial to good teaching. Students explore what it means to understand and teach through examination of topics which require rethinking disciplinary knowledge, assessment of learning, and motivation. Required fieldwork (4 hours weekly) focuses on learners' understandings and classroom structures.

EDUC 404 Learning and Teaching II  
Fall. 4 credits. Prerequisite: Admission to Cornell Teacher Education Program, or permission of instructor. Letter grade. Lec., TR 8:49-9:55; fieldwork, TBA. W. Camp, R. Crawford, A. Solomon  
Students analyze the art and science of teaching agriculture, mathematics, or science and develop their skills and knowledge as teachers through furthering their study of the processes of learning, planning (in relation to state and national standards), assessment, and teaching. Forty hours of fieldwork is required.
EDUC 459 Education in Africa and the Diaspora (also AS&R 459)
Fall. 3 credits (4 in College of Arts and Sciences). T 10:15-12:15. 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 on this concept and innovations and the stages of innovation as planned change, the course focuses on concrete cases and different types of educational innovations. The selected case studies, in 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 to be studied include African languages for instruction in Nigeria and science education in Uganda. It is geared to promote equal opportunity based on gender, race, and class in Africa and the African Diaspora.

EDUC 463 Policies, Practices, and Critical Issues of Distance Learning in Developing Countries
Spring. 3 credits. S-U grades optional. T 2:00-4:25. N. Assié-Lumumba. Distance learning is increasingly 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.

EDUC 468 Comparative Studies in Adult Education
Spring. 3 credits. S-U grades optional. T R 3:35-5:00. M. Kroma. Focuses on the history and philosophy of adult education programs in countries around the world. Literature on comparative adult education, international conferences on adult education, UNESCO adult-education publications, and international community development are analyzed in relationship to each student's exploration of adult education in two countries. Description of adult education in other countries is shared by international students.

EDUC 498 Undergraduate Teaching
Fall or spring. 1 or 2 credits. 4 credits maximum during undergraduate career. Limited to students with GPA of at least 2.7. S-U grades optional. Students must register using an Independent Study form (available in 140 Roberts Hall). Staff. Participating students assist in teaching a course, usually one in the laboratory section, to gain teaching experience, and regularly discuss teaching objectives, techniques, and subject matter with the professor in charge.

EDUC 499 Undergraduate Research
Fall or spring. 6 credits maximum during undergraduate career. Limited to juniors and seniors with GPAs of at least 2.7. Students must register using an Independent Study form (available in 140 Roberts Hall). Staff. This research affords opportunities for students to carry out independent research under appropriate supervision. Each student is expected to review pertinent literature, develop a project outline, conduct the research, and prepare a report.

EDUC 502 Education and Development in Africa (also AS&R 502)
Spring. 3 credits (4 in College of Arts and Sciences). S-U grades optional. T 2:00-4:25. N. Assié-Lumumba. In the 1950s and 1960s, human capital theory that emphasizes the importance of formal education for achievement of full productive potential of individuals and economic growth and development of countries enjoyed a renewed popularity. African countries promote education in terms with the expectation that it would lead to socioeconomic development. The initial euphoria, however, was followed by skepticism and then disillusion. Education, as it was being organized, delivered, received, and utilized began to be perceived even as a hindrance to development. This course examines the relationship between formal education and individual and national development. Different patterns of development, including modernization and dependency theories, and Third World Forum are examined. Issues discussed include education and schooling; the role of primary, secondary, and higher education in development, the problems of employment, language, equity in access; and results based on social class, ethnicity, race, and gender. Endogenous knowledge, new perspectives for relevant education, and the role of international cooperation and cooperation are also discussed.

EDUC 503 Diversity in the Classroom
Fall, spring, or summer. 1 credit for each seminar. Prerequisite: admission to the CTE program. S-U grades optional. Discussion, TBA. S. Kroma. This course builds on knowledge of literacy and diversity gained from course work and field activities in the CTE program. Students will review literacy development, cultural diversity, learning style preferences, fieldwork experiences, and strategies for accommodating difference in teaching.

EDUC 504 Research Experience for Teachers (also PL BR 504 and BIO G 504)
Spring. 3 credits. S-U letter grade. Prerequisites: appropriate study and major, 6 credits education or educational psychology course work, and permission of instructor. T. Fulton. This course is intended for, but not restricted to, students in the M.A.T. degree program, practicing teachers, and students who are considering becoming teachers. Students will work in a laboratory with a research team for the semester. Research experiences will be accompanied by weekly discussions and readings. Students will explore how research is conducted, how formal scientific discourse and informal communication occur and differ, and how these topics can be conveyed during classroom teaching.

EDUC 523 Food and Fiber Across the Curriculum
Summer. 1-3 credits. July 19-23, M-F (four overnights, on the road). The course is offered at the graduate level for 1-3 credits. 1 credit is granted for satisfactorily completing the course. Additional credits require completion of a special project agreed upon by the instructor. Expenses for food and incidentals are the responsibility of the participants. Lodging, course materials, and transportation are provided. J. Hawkes. This intensive five-day course focuses on agriculture and food systems as a classroom on wheels. The course is designed to help teachers, administrators, graduate students, extension agents, and other educators understand the complexity of the agriculture and food system. The course travels throughout upstate New York visiting farms of all types, forests, food processors, food retailers, and agriculture research and education centers. Participants explore agriculture, global and local food systems, environmental health, physical education, technology, and career exploration—while meeting all the State Learning Standards at the local level—is a course priority.

EDUC 548 Effective College Teaching
Spring. 1-3 credits. S-U grade option. T 7:00-9:40. D. Way. This course is designed to help participants become more effective college teachers. It examines the basic principles of learning, identifies different learning styles, and explores a variety of teaching techniques, methods, and technologies. Participants also learn how to design a course and improve their effectiveness as teachers.

EDUC 571 Social and Political Context of American Education
Fall. 3 credits. Prerequisites: admission to the Cornell Teacher Education Program or permission of instructor. T R 1:25-2:40. J. W. Sipple. This course examines the goals, roles, inputs, and outcomes of schooling in American society, and the policy environment in which schools operate. We analyze controversies
and tensions (e.g., equity, market forces, state control) surrounding public education at local, state, and federal levels. The course will include current and historical, urban and rural issues and problems.

EDUC 578 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 only. TBA. ITADP staff.

Designed for first-time international teaching assistants from countries in which English is not the primary language, the ITADP course 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 579 Further Training for International Teaching Assistants
Fall, spring, summer. 1–2 credits.
Prerequisite: EDUC 578. S-U grades optional. Lec, TBA: 3 contact hours per week. ITADP staff.

Designed for international teaching assistants from countries in which English is not the primary language and who have completed EDUC 578, the ITADP follow-up course provides further instruction and practice in oral English and pedagogical skills. Students participating in the course through mid-term receive one credit; those who are enrolled throughout the semester receive two credits.

EDUC 601 Secondary Agriculture, Science, and Mathematics Teaching Practicum
Fall or spring. 6 credits. Prerequisite: permission of instructor. S-U grades only. For graduate students enrolled in the Teacher Education in Science and Mathematics Program. MT W R F 8:00–3:00. S. C. Piliero, A. Solomon, and D. J. Trumbull and staff.

Supervised student teaching in agriculture, mathematics, or science at the secondary level. Program includes teaching in a local school for fourteen weeks.

EDUC 602 Practicum Seminar
Fall or spring. 9 credits. Prerequisite: concurrent enrollment in EDUC 601 or permission of instructor. MT W R F 9:00–3:00. Staff.

The course begins with full-day sessions of intensive consideration of theoretical frameworks relevant to all aspects of student teaching. Assignments and an on-line seminar during the semester require students to use those theories to develop and evaluate teaching materials and practices. Students complete an extensive portfolio documenting their work.

EDUC 603 Inquiry Science Outreach in Secondary Schools (also NTRES 603)
Fall or spring. 1 credit. Prerequisite: must be a fellow of a fellowship from Cornell Science Inquiry Partnerships (CSIP) program. S-U grades. N. Trautmann, L. Tompkins, and M. Kransky.

This course prepares graduate students who receive Cornell Science Inquiry Partnerships fellowships for outreach work in high school and middle school science classes. Participants explore effective strategies for inquiry-based learning and review core educational issues such as learning standards, working with students of various ability levels, and assessing student learning.

EDUC 611 Educational Psychology
Fall. 3 credits. Prerequisite: graduate student status, and either introductory psychology or permission of instructor. S-U grades optional. T R 11:15–12:15, F sec TBA. Offered concurrently with EDUC 411. D. E. Schrader.

This course examines psychological concepts of learning and teaching in schools and other learning environments. It examines education as a social, moral, intrapersonal, and interpersonal enterprise that promotes individual, social and community development.

EDUC 614 Gender, Context, and Epistemological Development (also FGSS 624)
Insight into how individuals make sense of knowledge is essential to teaching and learning. This course examines theories of personal epistemology and their implications for teaching. Development of the life span. Particular emphasis is placed on the role of gender and contextual influences on the development of thought and on metacognitive development.

EDUC 620 Internship In Education
Fall or spring. 1–6 credits. S-U grades optional. Each student, before course enrollment, must obtain the approval of a faculty member who will assume responsibility for supervising the work. Staff.

An opportunity for practical experience in educational professions development.

EDUC 621 Work-Experience Coordinator Certification Course I
Summer. 3 credits. Fall or spring. 2 credits. Letter grade only. Disc, R 2:00–5:00. Not offered 2004–2005. A. Wilson.

Current social and economic conditions affecting agricultural, extension, and adult education are examined. Principles, objectives, strategies, and sources of information are applied 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 622 Work-Experience Coordinator Certification Course II

The second course for certification as a work-experience coordinator combines course work and directed field experience leading to the planning, development, and approval of a work-experience program in a local educational agency. Development of a philosophy and policy statement, budget, curriculum for related instruction, annual work plan by function, promotional materials, and all program forms for Board of Education approval are required.

EDUC 630 Special Problems in Agricultural, Extension, and Adult Education
Fall or spring. May also be offered in summer. 1–3 credits. S-U grades optional. Staff.

The course provides an opportunity for graduate-level study of individually selected problems and issues in agricultural, extension, and adult education.

EDUC 632 Teaching Agricultural, Extension, and Adult Education
Summer. 3 credits. Prerequisite: an introductory course in teaching methods or permission of instructor. Staff.

The focus of the course is on the selection, use, and evaluation of methods and materials for teaching. Methods for group and informal instruction are covered. Opportunity is provided for students to develop teaching competence based on their individual needs and interests. Development of self-evaluation skills is included. A class project on the development of instructional materials is required.

EDUC 633 Program Planning in Agricultural, Extension, and Adult Education

Current social and economic conditions affecting agricultural, extension, and adult education are examined. Principles, objectives, strategies, and sources of information are applied 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 635 Experiential Learning

Participants explore various dimensions of scholar and practitioner thinking about the understanding and practice of experiential learning. Theoretical perspectives on experiential education, reflective practice, and a critical learning systems perspective are explored through readings and applied assignments. The instructor introduces methods of facilitation designed to encourage inquiry and dialogue for improvement of both nonformal and formal educational activities. The course process is intended to engage participants in reflective dialogue—nurturing emergence of learning community elements.

EDUC 645 Curriculum for a Diverse and Technological Society
Spring. 3 credits. Letter grade only. Disc, TBA. Staff.

Basic curriculum concepts, principles, and theories are examined. Special emphasis is given to the ways that diversity and technology drive changes in the development of curriculum. Each student chooses a particular curriculum for analysis as a project. Within that context, theoretical perspectives in curriculum and the basic elements of any curriculum are discussed.

EDUC 661 Administration Leadership and Organizational Change
Fall. 3 credits. T 3:35–6:00. J. W. Sipple.
Perspectives on the administration of educational organizations. Consideration of
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 671 American School Reform: Organizational and Sociological Perspectives
For individuals interested in the role of schools in society and in organizational behavior and public policy. This seminar investigates the sociological functions of schooling, including the stability of school organization given the long history of policy initiatives designed to reform schools. The focus is American K–12 public education, as well as pre-K, private, and post-secondary education are covered.

EDUC 680 Foundations of Extension Adult Education
An 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. Definitions, conceptual controversies, philosophical issues, and current research directions are examined through a seminar approach.

EDUC 682 Community Education and Development
Fall. 3 credits. Limited to 25 students. Letter grade only. W 1:25–4:25 S. Peters.
A critical study of the democratic purposes and practices of educators in community and economic development with a special focus on the role of education in community organizing. Key philosophies and traditions of community education and development are analyzed in their historical, cultural, social, and political contexts with an eye toward implications for contemporary practice.

EDUC 685 Training and Development: Theory and Practice (also IARD 685)
Spring. 4 credits. S-U grades optional. F 9:05–12:05; lab, TBA. M. Kroma.
Analysis, design, conduct, administration, and evaluation of training programs for the development of human resources in small-farm agriculture, rural health and nutrition, literacy and nonformal education, and general community development. Designed for scientists, administrators, educator-trainers, and social organizers in rural and agricultural development programs in the United States and abroad.

EDUC 694 Special Topics in Education
Fall, spring, or summer. 1–3 credits.
Prerequisite: permission of instructor. S-U grades optional. Staff.
Topics to be announced.

EDUC 704 Research Assistantship
Fall or spring. Variable. 6 credits. Limited to graduate students with permission of instructor. S-U grades optional. Staff.
For students assisting faculty with research. Does not apply to work for which students receive financial compensation.

EDUC 705 Extension Assistantship
Fall or spring. Variable. 6 credits. Limited to graduate students with permission of instructor. S-U grades optional. Staff.
For students assisting faculty with extension activities. Does not apply to work for which students receive financial compensation.

EDUC 711 Contemporary Issues in Educational Psychology
Fall and spring. Variable. 3 credits. TBA. Not offered 2004–2005. Staff.
This is a graduate-level seminar dealing with key issues in contemporary psychology having implications for educational practice and research. Topics vary from semester to semester. Students may take the course more than once.

EDUC 714 Moral Development and Education
This seminar focuses on current topics in moral psychology and research. Topics include the development of moral reasoning, the relationship between moral judgment and moral action, moral climate of schools and workplaces, moral education in secondary schools and universities, and professional ethics in educational settings.

EDUC 718 Adult Learning and Development
Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. W 2:00–4:25. Staff.
Deals with adult development and learning from points of view of educational psychology, sociology, and adult education. Inferences are drawn from theory and research to the practice of adult and extension education. Appropriate for graduate students in adult and extension education and community service education, and for others interested in adult learning and development.

EDUC 720 Seminar in Agricultural, Extension, and Adult Education
Spring. 3 credits. S-U grades optional. R 8:00–9:55 S. Peters.
Includes discussion and analysis of student and staff research.

EDUC 762 Comparative and International Education
Fall. 3 credits. S-U grades optional. M 2:00–4:25. N. Assie-Lumumba.
This seminar critically analyzes education conceived both as a universal social institution and a reflection of cultural, economic, and political dynamics in 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 783 Farmer-Centered Research and Extension (also IARD 783)
Fall. 3 credits. S-U option. M. Kroma.
This course provides an introduction to participatory traditions in farming systems research, extension, evaluation of rural development, technology generation, gender analysis, participatory rural appraisal, and documentation of local and indigenous knowledge of community-based development. Case studies of farmer-centered research and extension provide a focus for analysis. Appropriate roles of researchers and extensionists as partners with farmers are examined. A major contribution of farmer-centered research and extension is its potential to legitimate people's knowledge by enhancing their capacity to analyze and improve their own problems, to conduct their own research, and to empower them to take direct action to solve those problems.

EDUC 800 Master's-Level Thesis Research
Fall or spring. Credit TBA. S-U grades optional. Each student, before course enrollment, must obtain the approval of a faculty member who will assume responsibility for guiding the work. Hours TBA. Staff.

EDUC 900 Doctoral-Level Thesis Research
Fall or spring. Credit TBA. Limited to students working on theses or other research and development projects. S-U grades optional. Each student, before course enrollment, must obtain the approval of a faculty member who will assume responsibility for guiding the work. Hours TBA. Staff.

ENTOMOLOGY

Courses by Subject

Agriculture: 260, 264
Behavior: 215, 325, 394, 471, 662
Conservation: 344
Ecology: 452, 455, 456, 470, 471, 672
Introductory courses: 201, 210, 212, 215, 241
Medical entomology and veterinary entomology: 3, 522, 562
Morphology: 328
Pathology: 463, 670
Pest management: 241, 277, 441, 443, 444, 477, 644, 670
Physiology, development, and toxicology: 370, 485, 490, 685
Systematics: 331, 333, 453, 634, 635
Note: class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.
Check the web site for updates.

[ENTOM 201 Alien Empire: Bizarre Biology of Bugs]
Insects are the most abundant and diverse animals on earth. This course explores the bizarre biology of insects by examining their evolutionary history, anatomy, development, feeding habits, life-history strategies, behavior, and their interactions with humans (both positive and negative) through history. Optional field trips and one open lab provide hands-on opportunities for examining these amazing animals.

[ENTOM 210 Plagues and People]
Fall. 2 or 3 credits. Prerequisites: introductory biology or permission of instructor. Lecs, M W 2:30. Offered alternate years. Not offered 2004; next offered fall 2005. L. C. Harrington.
Human diseases transmitted by insects and related forms (arthropods) have impacted human lives and society through history. This course focuses on the pathogens, parasites, and arthropods causing human plagues. Special attention is paid to those plagues that have had the greatest impact on human culture and expression. Lectures are supplemented with readings and films. Emerging diseases, bioterrorism, and future plagues also are addressed. Students taking the course for 3 credits will participate in reading and preparation of discussion each week (on Fridays), weekly readings quizzes, and will have a comprehensive final project.

[ENTOM 212 Insect Biology]
Fall. 4 credits. Prerequisites: BIO G 101-102 (may be taken concurrently) or equivalent. Lecs, T R 11:15-12:05; labs, T W or R 1:25-4:25. Lab fee $38. Q. D. Wheeler.
Introduces the science of entomology by focusing on basic principles of systematic, morphology, physiology, behavior, and ecology of insects. The laboratory in early fall includes field trips to collect and study insects in the natural environment. A collection emphasizing ecological, behavioral, and taxonomic categories is required.

[ENTOM 215 Spider Biology: Life on a Silken Thread]
Fall. 2 credits. Prerequisite: introductory biology or permission of instructor. S-U grades optional. Lecs, W F 1:25-2:15. L. S. Rayor.
An introduction to the fascinating world of spiders. Evolution, behavior, and physiology of spiders and their close kin are explored from a modern perspective. Topics include identification of major spider families, spiders' unique use of silk, risky courtship, predation behavior, diverse life styles, social spiders, and potential use in IPM.

[ENTOM 241 Insect Pest Management for Practitioners]
An introduction to insect pest management in plant or animal protection for those preparing for careers in extension, service, and production. Emphasis on pest monitoring, sight identification, diagnosis, decision-making, and management tactics for the major groups of insect and arthropod pests affecting field, forage, and vegetable crops; floriculture; woody ornamentals, and turf; urban environments and public health; veterinary, dairy, livestock, and poultry. Five off-campus laboratory field trips with demonstrations of pest management decision-making, pest-monitoring tools, and pesticide-application equipment.

[ENTOM 260 Introductory Beekeeping]
Introduces students to the life history, physiology, and behavior of honey bees, as well as to the fundamentals of practical beekeeping. Classical and contemporary research on the dance language, chemical communication, behavioral genetics, division of labor, and evolution of social behavior are reviewed. Lectures on pollination of agricultural crops, honey and beekeeping, bees in ancient and modern rituals, Africanized honey bees, and insect politics are also included.

[ENTOM 264 Practical Beekeeping]
Fall. 1 credit. Limited to 20 students. Prerequisite: ENTOM 260 (may be taken concurrently). Lab, R 2:00-4:25. Offered alternate years. Not offered fall 2004; next offered fall 2005. N. W. Caldecote.
This course consists of 14 laboratory sessions that acquaint students with practical methods of colony management. Laboratories involve harvesting work with honey bee colonies and equipment. Program topics covered include management of bees for apple pollination, honey harvesting and processing, and disease identification/control. The class makes a number of field trips to commercial beekeeping operations. Students conduct simple experiments to demonstrate color perception by bees, as well as the chemical basis for swarming, nest guarding, and mating.

[ENTOM 277 Natural Enemies Managing Pests: An Introduction to Biological Control]
An introduction to the dynamic field of biological control. What is it and when should it be used? This course covers a diversity of types of biological control including use of parasites, predators, pathogens, and competitors as agents of control. Concepts and techniques to control pests from microbes to weeds to invertebrates and vertebrates. This course is intended for students curious about safely protecting pest.

[ENTOM 292 Comparative Insect Morphology]
Spring. 5 credits. Prerequisite: ENTOM 212 or 241. Lects, M W F 9:05; labs, M W 1:25–4:25. Offered alternate years. B. N. Danforth.
This course provides a detailed introduction to the external and internal anatomy of insects. Lectures introduce basic concepts in insect morphology, such as the organization of the insect body plan and organ systems. Functional morphology, homology, phylogeny, modularity, and development. The laboratory portion of the course introduces students to the basic methods of insect microdissection, specimen preparation, and scientific illustration. High-quality, publishable illustrations are produced based on student artwork.

[ENTOM 295 Insect Behavior]
Spring. 3 credits. Prerequisite: introductory biology or introductory entomology or permission of instructor. Lecs, T R 10:10–11:25. Offered alternate years. L. S. Rayor.
Insects are the most diverse organisms on earth, with equally diverse behaviors. 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, and social behavior. Topics include insect learning, perceptual abilities, host finding strategies, predation, pollination, and examination of current issues in insect behavior.

[ENTOM 331 Introductory Insect Systematics]
An introduction to the classification, evolutionary history, and distribution of insects. Laboratory practice in the identification of orders, families, and representative genera of insects; methods of collection, preservation, and study. Lectures on theory and practical insect systematics and major features of insect evolution. Insect collections are required.

[ENTOM 333 Maggots, Grubs, and Cutworms: Larval Insect Biology]
Fall. 3 credits. Prerequisites: ENTOM 212 or permission of instructor. S-U grades optional. Lecs, T R 11:15; lab, T 1:25–4:25. Offered alternate years. J. K. Liebherr.
The evolutionary history of the Holometabola has been greatly informed by attributes of their larvae. This course introduces students to the biology, anatomy, and natural history of holometabolous insect larvae. The laboratory includes field sampling, curation of field-collected specimens, and identification of unknowns. Development of a small larval collection is required.

[ENTOM 344 Insect Conservation Biology]
Spring. 3 credits. Prerequisite: one course in either entomology or conservation biology or permission of instructor. S-U grades optional. Lecs, T R 10:10–11:25. Offered alternate years. Not offered spring 2005; next offered spring 2006. J. E. Losey.
Provides an in-depth look at the conservation of insects and other invertebrates. Topics covered include sampling rare populations; insect conservation genetics; the role of phylogeny.
in determining conservation priorities; refuge design; saving individual species; plus 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 352 Medical and Veterinary Entomology**

Fall. 3 credits. Prerequisites: BIOG 101–102 or permission of instructor. S-U grades optional. Lecs, T R 10:10; lab, R 1:25–4:25. Offered alternate years. L. C. Harrington.

Diseases resulting from arthropod-borne pathogens (such as malaria, dengue, and yellow fever) cause considerable human suffering and death worldwide. Diseases resulting from arthropod-borne pathogens (such as malaria, dengue, and yellow fever) cause considerable human 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 of the course is to encourage an understanding of evolutionary and ecological issues associated with disease transmission. The laboratory includes field trips, collection, and identification of medical/ veterinary interest, and hands-on experience with modern laboratory research methods. Undergraduate and graduate students from entomology as well as other disciplines including pre-medical and veterinary study are encouraged to enroll.

**ENTOM 370 Pesticides, the Environment, and Human Health (also TOX 370)**

Fall. 2 credits. Prerequisites: BIOG 101–102 or equivalent. Lecs, T, R 9:05. Offered alternate years. J. G. Scott.

A survey of the different types of pesticides, their uses, properties, and effects on the environment. Discussion of the risks, benefits, regulation, politics, and current controversies associated with pesticide use and genetically modified crops.

**ENTOM 394 Circadian Rhythms (also BIOG 394, BIONB 394, and PL PA 394)**

Fall. 2 credits. Prerequisite: 200-level biology course. S-U grades optional. Lecs, T 10:10–11:50; K. Lee (fall, even years) and J. Ewer (fall, odd years).

This course explores a fundamental feature of living organisms from all kingdoms: how the cellular 24-hour biological clock operates and influences biological activities. The course 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).

**ENTOM 400 Insect Development (also BIOG 402)**


The course emphasizes the mechanisms that underlie embryonic and post-embryonic developmental processes of insects. The portion of the course on embryonic development leans heavily on knowledge obtained from Drosophila, but also covers more classical studies as well as recent advances exploring the molecular basis for the evolution of body plan. The post-embryonic development portion covers the control of growth, molting, and metamorphosis. The laboratory uses modern techniques to illustrate developmental events at the organismal and cellular level. The discussion section involves the analysis and presentation of primary research papers.

**ENTOM 443 Entomology and Pathology of Trees and Shrubs (also PL PA 443)**

Fall. 4 credits. Prerequisites: ENTOM 212 or equivalent and PL PA 241 or equivalent. S-U grades optional. Lecs, M W F 11:15; lab, F 1:25–4:25. Offered alternate years. P. A. Weston and G. W. Hudler.

For students preparing for careers in horticulture, urban forestry, pest management, and natural history/science education. Deals with the nature, diagnosis, assessment, and management of insect and disease pests on trees and shrubs in forests, urban landscapes, Christmas tree plantations, and other sites where intensive pest management is practiced.

**ENTOM 444 Integrated Pest Management (also CSS 444)**

Fall. 4 credits. Prerequisites: introductory biology or permission of instructor. Lecs, M W F 9:05; labs, M 1:25–4:25. J. E. Losey and A. Ditomasso.

Lectures integrate the principles of pest control, ecology, and economics in the management of pests across multiple systems. Laboratories consist of exercises to reinforce concepts presented in lectures and to demonstrate pest monitoring techniques and the application of computer technology to management problems.

**ENTOM 452 Herbivores and Plants: Chemical Ecology and Coevolution (also BIOE 452)**

Spring. 3 credits. Prerequisites: 1 year of introductory biology; BIOE 261; CHEM 257 or 357/358 and 251 or 301; or permission of instructor. Lecs, M W F 11:15. Offered alternate years. P. P. Feeny.

Significance of plant chemistry in mediating interactions between plants and herbivorous animals. Mechanisms and strategies of plant finding and exploitation by animals, especially insects, and of defense and escape by plants; evolutionary hypotheses for ecological patterns of resistance and attack; implications for human food and agriculture.

**ENTOM 453 Principles and Practice of Historical Biogeography (also BIOPL 453)**


A survey of techniques in historical biogeography, and the development of modern biogeographic theory in the context of classical, ecological, and phylogeographic analytical methods. Geological and paleontological aspects of biogeography are presented, and large-scale biogeographic patterns discussed. Laboratories focus on computer applications and discussion of controversial issues.

**ENTOM 455 Insect Ecology (also BIOEE 455)**

Fall. 3 credits. Prerequisites: BIOEE 261 or equivalent and ENTOM 212 or equivalent knowledge of another taxon. S-U grades optional. Lecs, M W F 11:15. Offered alternate years. Not offered fall 2004; next offered fall 2005. Staff.

Topics include the nature and consequences of biotic diversity, biogeography, coevolution, adaptive syndromes exhibited by various guilds, population regulation, impact of insects on ecosystems, comparative and functional analysis of communities, and differences in the organization of natural and managed systems. Ecological and evolutionary principles are integrated by thorough study of exemplars.

**ENTOM 456 Stream Ecology (also BIOEE 456 and NTRES 456)**


Lecture addresses the patterns and processes occurring in stream ecosystems, including channel formation; water chemistry; watershed influences; plant, invertebrate, and fish community structure; nutrient cycling; trophic dynamics; colonization and succession; community dynamics; conservation; and the impacts of disturbances. Field projects include descriptive and experimental techniques, hypothesis testing, and writing of scientific papers related to environmental assessment.

**ENTOM 463 Invertebrate Pathology**


Lecture presents principles of pathology as applied to invertebrates. Topics explored include infectious and infectious diseases caused by viruses, bacteria, fungi, protozoa, and nematodes, epidemiology of insect diseases, and use of pathogens for control. Laboratory involves a diversity of pathogens and hosts using techniques such as microinjection, electrophoresis, immunassay, density gradient centrifugation, soil extraction, and computer simulation.

**ENTOM 470 Ecological Genetics**

Spring. 3 credits. Prerequisites: BIOE 278 or permission of instructor. S-U grades optional. Lecs, T R 11:40. B. P. Lazzaro.

This course focuses on the application of population genetic concepts in ecological, or applied contexts. Emphasis is placed on measuring adaptation in natural populations, detecting the effects of population demography, and determining the genetic basis of quantitative traits. Examples are drawn 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 471 Freshwater Invertebrate Biology and Biomonitoring**

collections and identification of invertebrates. Laboratory involves field gathering of terrestrial insects. The use of taxonomic keys.

**ENTOM 477 Biological Control**

Lectures present case studies exploring classical biological control, augmented by selected topics in the control of arthropods and weeds. Labs focus on selected concepts of the field. Students prepare a collection of freshwater invertebrates and accompany laboratory studies on identifying aquatic and terrestrial insects. The course stresses the use of taxonomic keys.

**ENTOM 483 Insect Physiology**
Fall. 5 credits. Prerequisite: ENTOM 212 or permission of instructor. Lecs. M W F 11:15; lab. W 12:25-4:25. TBA. Offered alternate years. C. Gilbert.

This course introduces students to the biology of insects, emphasizing the study of structure and function in insects. A major focus is on the current state of insect physiology, with an emphasis on physiological responses to environmental stimuli. Students are introduced to some common physiological research and to the critical reading of scientific literature.

**ENTOM 490 Toxicology of Insecticides (also TOX 490)**

Lectures explore the morphology, physiology, phylogeny, life histories, behavior, feeding ecology, and evolution of macroscopic freshwater invertebrates with an emphasis on understanding the attributes of aquatic and terrestrial insects. Laboratory involves field collections and identification of invertebrates and stresses the use of taxonomic keys.

**ENTOM 497 Individual Study in Entomology**
Fall or spring. Credit TBA. Prerequisite: permission of instructor. Students may register using an Independent Study form (available in 140 Roberts Hall). Staff.

This advanced course in integrated pest management (IPM) consists of a rotating series of four-week intensive modules on specialized topics. Topics range from basic ecology and genetics of pests and their natural enemies to specific strategies for pest management implementation. Each module is a unique unit and students may take any or all modules each time the course is offered. Prerequisites and grading procedures are determined by the instructor(s) of each module. Potential modules include: Insecticide Resistance and Resistance Management—J. Scott; Entomology (Ithaca); Crop Protection Decision Making—J. Nyrop; Entomology (Geneva); Greenhouse and Floriculture IPM—J. Sanderson; Entomology (Ithaca); Agricultural Acarology—J. Sanderson; Entomology (Ithaca); Fruit Arthropod IPM Methods in New York—A. Agnello; Entomology (Geneva); Plant Resistance—W. Tinsley; Entomology (Ithaca); Aerial Sampling in Pest Management—E. Shields; Entomology (Ithaca); Conservation Biological Control—J. Nyrop and G. English-Loeb; Entomology (Geneva); Insect Population Ecology—J. Losey; Entomology (Ithaca); Veterinary Entomology—IPM Methods for New York—P. Kaufman and D. Rutz; Entomology (Ithaca); Chemical Conversations and Integrated Pest Management—C. Linn; Entomology (Geneva).

**ENTOM 652 Seminar in Medical Entomology**
Fall. 1 credit. Prerequisite: permission of instructor or ENTOM 352. Disc. TBA. C. Gilbert.

**ENTOM 653 Special Topics in Systematic Entomology**
Fall or spring. Taught on demand. 2-4 credits. Prerequisite: permission of instructor. Staff.

Lectures on the classification, evolution, and biogeography of selected taxa, with accompanying laboratory studies on identifying representative morphological characters. Collections sometimes required.

**ENTOM 655 Insect Molecular Systematics**
Spring. 2 credits. Prerequisite: permission of instructor. TBA. Offered alternate years. Not offered spring 2005; next offered spring 2006. Hours, TBA. C. Gilbert.

**ENTOM 670 Seminar on Biological Control**
Fall or spring. 4 credits maximum. S-U grades optional. Staff.

This is an upper level seminar series in biological control covering topics chosen by participating students and faculty. The course format consists of 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 672 Seminar in Aquatic Ecology**
Spring. 1 credit. Generally appropriate for graduate students only. Interested undergraduates must contact the instructor. Prerequisites: permission of instructor or either ENTOM 456 or 471, or BIOEE 261, 462. S-U grades optional. Hours, TBA. Offered alternate years. Not offered spring 2005; next offered spring 2006. B. L. Peckarsky.

**ENTOM 676 Seminar in Insect Physiology**
Spring. 1 credit. S-U grades optional. Prerequisite: permission of instructor. TBA. Offered alternate years. C. Gilbert.

**ENTOM 707 Individual Study for Graduate Students**
Fall or spring. Credit TBA. Prerequisite: permission of instructor. Not for thesis research. Staff.

**ENTOM 709 Teaching Entomology**
Credit TBA. Staff.

Teaching entomology or for extension training.

**ENTOM 767 Current Topics in Entomology**
Fall. 1 credit. Required of graduate students pursuing a degree in the field of Entomology. Lecs and disc. TBA. Coordinator: E. J. Shields.

This course provides lectures, readings, and discussion to introduce first-year graduate students to the research activities of faculty members in the graduate field of Entomology. Class meets weekly for one hour.
ENTOM 800 Master’s-Level Thesis Research
Credit TBA. Prerequisite: permission of instructor. S-U grades optional. Staff.

ENTOM 900 Doctoral-Level Thesis Research
Credit TBA. Prerequisite: permission of instructor. S-U grades optional. Staff.

Jugatee Seminar
Fall and spring.
A seminar conducted by Jugatee, the entomology club of Cornell University, to discuss topics of interest to its members and guests. All interested undergraduate and graduate students are encouraged to attend.

Entomology 900 Doctoral-Level Thesis Research
This is a discussion-based course designed to explore current issues and controversies that involve relationships between food and health. A required reading from the popular press or the scientific literature will be assigned each week. S-U grades will be based on attendance, overall participation, and the oral presentation. Topics may include but are not limited to: the obesity epidemic, food irradiation, food safety, plant sterols, heart disease, eating disorders, functional foods, dietary supplements, food regulations, genetically modified foods and other current issues. Several classes will be held at a Cornell dining facility on selected Wednesday evenings during the semester.

FD SC 200 Introductory Food Science
Fall. 3 credits. Prerequisite: college-level courses in chemistry and biology. Letter grades only. M W F 11:15–12:05. J. H. Hotchkiss.
A comprehensive introduction to the principles and practice of food science and technology. Topics include: chemistry of foods; nutritional significance; food formulation, preservation, and processing; microbiology and food safety; composition and processing of food commodities; and contemporary issues including food safety, regulation, and world food needs. Interrelationships between the chemical, physical, nutritional, and quality properties of foods as affected by formulation, processing, and packaging are stressed.

FD SC 210 Food Analysis
Introduces basic analytical techniques for food analysis and other biological analysis. Emphasizes fundamental principles of analytical chemistry, basic laboratory techniques, and modern instrumental methods: gravimetric, volumetric, and spectrophotometric methods, gas chromatography (GC), high-performance liquid chromatography (HPLC), infrared spectra (IR), and atomic absorption spectrometry are discussed.

FD SC 230 Sophomore Seminar: Functional Foods; Where Food Science and Nutrition Meet (also NS 230)
Spring. 2 credits. Limited to 15 students. Lec, TBA (2 one-hour meetings per week). S. J. Mulvany and J. J. M. Brown.
Functional foods are those whose nutrient composition has been modified to achieve targeted health outcomes. This course explores the interface where nutritional science and food science can work together to design and produce foods to meet certain health goals using a case study approach. Each case study involves interdisciplinary discussion, and a writing assignment that includes both technical (e.g., scientific basis for diet-health claims) and nontechnical (e.g., personal experience and opinions related to functional foods) content.

FD SC 250 Kosher and Halal Food Regulations
A comprehensive introduction to kosher and halal foods in the American food industry with some coverage of home practices. The kosher food laws, their origin, and their application in modern food processing are examined. The nature of the kosher supervision industry in America is described. Halal laws are also examined and the interactions between the two communities explored. Current food-related issues in both communities are reviewed, including recent court decisions. Some aspects of ethnic foods may also be considered.

FD SC 290 Meat Science (also AN SC 290)
Fall. 2 or 3 credits. Letter grades only. Lecs, T R 11:15; lab, M or R 12:20–3:20. Lab cannot be taken without lecture. D. E. Shaw.
An introduction to meat science through a study of the structure, composition, and function of muscle and its conversion to meat. Properties of fresh and processed meat, microbiology, preservations, nutritive value, inspection, and sanitation are also studied. Laboratory 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.

FD SC 300 Food Engineering Principles
Fall. 3 credits. Prerequisites: FD SC 290 and introductory physics. Letter grades only. M W F 9:05–9:55; disc, TBA. S. H. Rizvi.
Introduces the engineering principles underlying food processing systems. Topics covered include thermodynamics, mass and energy balance, fluid mechanics, heat and mass transport, and refrigeration and psychrometrics.

FD SC 351 Milk Quality
Fall. 1 credit. Prerequisite: AN SCI 250 or equivalent or permission of instructor. Letter grades only. M W F 12:20–1:10. M. Wiedmann. This course 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.

FD SC 394 Applied and Food Microbiology (also BIOMI 394)
Fall. 3 credits. Prerequisites: BIOMI 290–291. M W F 12:20–1:10. 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. Issues related to the biochemistry, genetics, and physiology of microorganisms important in these processes are reviewed. A two-credit core section on food microbiology is complemented by a one-credit section on industrial/biotechnology applications.
FD SC 395 Food Microbiology Laboratory
Fall. 2 credits. Prerequisite: BIOMI 291 or equivalent. Letter grades only. M W 2:00-4:25. J. M. Brown.
Work includes study of the physiological characteristics of representative food microorganisms, practice in using general and rapid methods for microbiological testing and control of food products, and practice in the application of a systematic approach to controlling the safety of foods, or addressing a food safety issue.

FD SC 396 Food Safety Assurance
Spring. 2 credits. Prerequisite: BIOMI 290 or permission of instructor. T R 9:05-9:55. Offered alternate years; not offered spring 2006. R. B. Gravani.
This course provides information on procedures to control biological, chemical, and physical hazards and assure the safety of foods. Topics include discussions on the Hazard Analysis Critical Control Point (HACCP) concept, good manufacturing practices, prerequisite programs, and the application of current technologies in reducing the risk of foodborne illnesses. Case studies and class projects are used to demonstrate and apply the key principles that are discussed.

FD SC 400 Current Topics in Food Science and Technology
Discussion of current topics in food science. Topics vary and are chosen from scientific literature and popular press.

FD SC 401 Concepts of Product Development
A 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, marketing and promotion.

FD SC 402 Agriculture in the Developing Nations I (also IARD 402)
Fall. 2 credits. Prerequisite: upper-class or graduate-student standing. K. V. Raman and W. R. Coffman.
The goal of this course is to acquaint students with the major issues and problems in international agriculture and rural development and to show how problems in development are being addressed by international, government, and nongovernmental organizations. The lectures/discussions attempt to establish the global context for sustainable agricultural development and focus on agriculture and rural development in the tropics, using case studies. This course may be taken as a stand-alone survey course in international agriculture, but it is also the preparatory course for participation in Agriculture in the Developing Nations II (FD SC 602), which includes a trip to a developing country during the intersession.

FD SC 405 Managing Food Waste Without Trashing the Environment
Spring. 2 credits. Prerequisite: FD SC 200 or its equivalent. Letter grades only. Lec, M 12:30-2:15, lab, M 2:30-4:25. Offered alternate years; not offered spring 2006. J. M. Regenstein.
A look at the various waste streams generated by food plants, institutional feeders, supermarkets, and nongovernment agencies. The course addresses how various food waste processes are covered as a general introduction to available waste management technologies and to policy issues faced by a wide range of businesses and production plants.

FD SC 406 Dairy and Food Fermentations
This lecture course covers the basic principles of fermentation, the microbiology of food fermentations (including the physiology and genetics of 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.

FD SC 410 Sensory Evaluation of Food
Topics include the sensory evaluation methods used to test the flavor, appearance, and texture of foods by quantitative description and simple difference testing; consumer testing for product acceptability; sensory tests in quality control; strategic product research; and product development. The psychological principles in sensory testing and statistical methods for sensory data analysis are presented. The laboratory provides first-hand experience in organizing and conducting sensory tests and an introduction to online data collection and analysis. Undergraduate Food Science majors are required to take both the lecture and the laboratory.

FD SC 415 Principles of Food Packaging
The chemical and physical properties and manufacture of the basic materials used to construct packaging are discussed. Emphasis is on newer packaging technologies and materials. Economics, design, and regulation of food packaging are briefly presented.

FD SC 417-418 Food Chemistry I and II
A course on the chemistry of foods and food ingredients. The chemical and physical properties of water, proteins, lipids, and carbohydrates, and other food components and additives are discussed in the context of their interactions and functional roles in foods. The effects of chemical changes during processing and storage on the quality and nutritional aspects of several food commodity groups (dairy, meat, fruits and vegetables, cereals, and legumes) are described.

FD SC 419 Food Chemistry Laboratory
Spring. 2 credits. Prerequisites: biochemistry (BIOM 350 or 351 or CHEM 257 or equivalent) and concurrent registration in food chemistry (FD SC 417). R 12:20-4:25. D. D. Miller.
Laboratory exercises dealing with the chemical properties of food components and changes they undergo in processing and storage. Relationships between the chemical composition of foods and functional, nutritional, and organoleptic properties are stressed. Laboratory techniques commonly used in food research are introduced. A laboratory research project is required. This involves writing a research proposal for the project, conducting laboratory research to test hypotheses and analyzing the data, and writing a proposal following the format used by the Journal of Food Science.

FD SC 423 Physical Principles of Food Preservation and Manufacturing
This course emphasizes the fundamental principles that underlie much of food preservation and manufacturing. A systems analysis approach is used 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.

FD SC 425 Dairy Foods Processing
A lecture/laboratory course focused on principles and practices fundamental to the manufacture, evaluation, and storage of dairy foods. A variety of common food processing unit operations are discussed and demonstrated using dairy foods as examples. Students develop an understanding of the science and technology that underpins modern dairy foods processing and gain hands-on experience in the manufacture of safe, high-quality dairy products. Laboratories are conducted in a food processing pilot plant facility. One field trip to operating dairy plants in the area will be scheduled during the semester.

FD SC 430 Understanding Wine and Beer
Spring. 3 credits. Prerequisites: introductory biology and chemistry or permission of instructor. Students must be 21 years old by the first day of class (Jan. 24, 2005) to enroll. S-U grades optional. T R 12:20-2:30. T. A. Acree, T. Henick-Kling, and K. J. Siebert.
An introduction to wine and beer appreciation through the study of fermentation biology, product composition, and sensory perception. Sampling of wineries and breweries is used 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 winemaking techniques; and the effects of brewing raw materials and processing procedures on beer quality.

**FD SC 450 Fundamentals of Food Law**
Spring. 2 credits. Letter grades only.LEC M 1:25-3:20. Offered alternate years; next offered spring 2006. J. M. Regenstein. Introduction to the complex array of federal and state statutes and regulations that control the processing, packaging, labeling, and distribution of food, including aspects of safety and nutritive value. Emphasis is on the Food and Drug Administration and U.S. Department of Agriculture regulations, but the course also refers to other regulatory agencies. Emphasis is placed on how a food or agricultural professional interacts with the U.S. legal system during legislative action, regulatory rule making, and with respect to compliance.

**FD SC 456 Advanced Concepts in Sensory Evaluation**
Spring. 2 credits. Prerequisite: FD SC 410. S-U grades optional. Offered alternate years; not offered spring 2006. F 1:25-3:20. 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. A major independent research project is conducted on a current issue in sensory evaluation.

**FD SC 480 Global Seminar: Building Sustainable Environments and Secure Food Systems for a Modern World (also NTRES 480, IARD 480)**
Spring. 3 credits. Prerequisites: junior, senior, or graduate-student standing. J. Lassioe and D. Miller. Modernization has led to development pressures that have increasingly disrupted natural systems, leading to widespread concerns about the long-term viability of important environmental services, including those critical to food security worldwide. This multidisciplinary course uses case studies to explore interrelationships among social, economic, and environmental factors basic to sustainable development. Cases include population growth, genetically modified foods, biodiversity, sustainable tourism, global warming, and global responsibility. Cornell faculty members lead discussions in each of the major topic areas. In addition, students participate in discussions and debates with students from Sweden, Costa Rica, Honduras, South Africa, and Australia through live interactive videoconferences and electronic discussion boards.

**FD SC 494 Special Topics in Food Science**
Fall or spring. 4 credits maximum. S-U grades optional. Staff. Departmental approval required. The dependence of all teaching "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.

**FD SC 497 Individual Study in Food Science**
Fall or spring. 3 credits maximum. Prerequisite: permission of instructor. Students must register using an Independent Study form (available in 140 Roberts Hall). S-U grades optional. Staff. May include individual tutorial study, a special topic selected by a professor or a group of students, or topics lectures of a course already offered. Since topics vary, the course may be repeated for credit.

**FD SC 498 Undergraduate Teaching Experience**
Fall or spring. 3 credits maximum. Prerequisite: permission of instructor. Students must register using an Independent Study Form (available in 140 Roberts Hall). S-U grades only. Staff. Students assist in teaching a course appropriate to their previous training and experience. Credit is for a discussion or laboratory section and regularly discuss objectives with the course instructor.

**FD SC 499 Undergraduate Research in Food Science**
Fall or spring. 4 credits maximum. S-U grades optional. Students must register using an Independent Study Form (available in 140 Roberts Hall). This course may be repeated for credit. Staff. Students conduct original research directed by a food science faculty member. Graduate students in the field of Food Science and Technology. Directed research.

**FD SC 599 Research for Lausanne Exchange Students**
Fall or spring. 10 credits maximum. Prerequisite: permission of instructor. S-U grades optional. Staff. Undergraduate senior thesis research for Lausanne exchange students only. Students conduct original research directed by a food science faculty member. A final report is written and presented to the faculty of both Cornell University and the University of Lausanne.

**FD SC 600 Seminar in Food Science**
Fall and spring. 1 credit. S-U grades only. Required for all graduate students in the field of Food Science and Technology. T 1:00-5:00 Staff. A weekly seminar series on contemporary topics and issues in the field of Food Science and Technology. Open to graduate students in Food Science and Technology.

**FD SC 602 Agriculture in the Developing Nations II (also IARD 602)**
Spring. 3 credits. Prerequisites: FD SC 402 and (or) permission of instructor. Field trip to India during January. Note: cost of January 2005 field-study trip is approx. $2,500, which includes airfare, board, and lodging (some merit- and need-based financial aid may be available). T 2:30-4:25 until midterm only. K. V. Raman and W. R. Coffman. Oriented to provide students an opportunity to observe agricultural development in a tropical environment and promote interdisciplinary exchange among students. The two-week experiential field-study trip to India is followed, during January, by discussions and assignments dealing with problems in food, agriculture, and livestock production in the context of social and economic conditions.

**FD SC 604 Chemistry of Dairy Products**
Fall. 2 credits. Limited to students introductory organic and biochemistry, food chemistry, and a dairy foods processing course. Permission of instructor required, if lacking prerequisites. Letter grades only. Offered alternate years; not offered fall 2005. F 1:25-3:20. D. M. Barbanon. A detailed study of milk constituents and their properties. The chemical and physical changes that occur in dairy products prior to, during, and after processing. This course emphasizes current research in dairy chemistry.

**FD SC 607 Advanced Food Microbiology**
Spring. 2 credits. Prerequisites: Microbiology (BIOMI 290), Food Microbiology (FD SC 394). Letter grades only. Offered alternate years; next offered spring 2006. M W 11:15, M. Wiedmann. This two-credit course explores advanced topics in food microbiology. A major emphasis is placed on critical evaluation of current literature and on microbial concepts that affect food microbiology. Specific areas that are covered include microbial ecology of foods, rapid detection and typing methods for foodborne pathogens, microbial modeling, pathogenesis of foodborne diseases, and food applications of genetic engineering. Some guest lectures may be arranged to provide an introduction to other advanced food microbiology topics (e.g., risk assessment).

**FD SC 608 Chemometric Methods in Food Science**
Fall. 2 credits. Prerequisites: basic statistics and chemistry or permission of instructor. S-U grades optional. W 1:25-3:20. Offered alternate years; not offered fall 2005. K. J. Siebert. Food science applications using quantitative 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.

**FD SC 616 Flavors—Analysis and Applications**
Spring. 2 credits. S-U grades optional. LEC, F 1:25; disc, F 2:30. Offered alternate years; next offered 2006. H. T. Lawless and T. E. Acree. An 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. The course surveys taste, aroma, and volatile flavors, and emphasizes issues from the perspectives of chemical structures, methods of analysis, uses and interactions in food systems.
FD SC 620 Food Carbohydrates (also NS 620)
Spring. 2 credits. Limited to qualified seniors and graduate students. Prerequisite: BIOM 350 or equivalent. T R 10:10-11:00. Offered alternate years; next offered spring 2006. B. A. Lewis and J. W. Brady.
A consideration of the chemistry of food processing and storage systems and the changes occurring during the metabolism of complex carbohydrates. Emphasis is on the carbohydrates, including sugars, starches, pectins, hemicelluloses, gums, and other complex carbohydrates. Emphasis is on the intrinsic chemistry and functionality in food systems and the changes occurring during food processing and storage.

FD SC 621 Food Lipids
Spring. 2 credits. Letter grade only. Prerequisite: a basic biochemistry course.
An advanced course in food lipids. Describes the physical, chemical, biochemical, and functional properties of lipids. Emphasis is on lipid oxidation, emulsions, and functional foods associated with lipids.

FD SC 622 Nutraceuticals and Functional Foods
Spring. 2 credits. Prerequisites: a course in biochemistry equivalent to BIOM 350 and one year of college biology or permission of the instructor. Letter grade only. Offered alternate years; next offered spring 2006. M W 2:30-3:20. R. H. Liu.
This course covers nutraceuticals and functional foods. Natural bioactive compounds, antioxidants, and dietary supplements, botanicals and herbs in disease prevention and health promotion. Emphasis areas will include the mechanisms of action and scientific evidence of efficacy of nutraceuticals and functional foods. Safety and efficacy testing, and regulations for nutraceuticals and functional foods will also be discussed.

FD SC 644 Food Polymer Science: Principles and Applications
Integration of 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. Emphasis is on 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.

FD SC 665 Food and Bioprocessing Systems
Fundamental and quantitative analyses of processes for manufacture of foods and related biological products. Topics covered include crystallization, membranes, supercritical fluids, extrusion, high pressure, pulsed electric field, thermal processing, drying, and crystallization.

FD SC 694 Special Topics in Food Science
Fall or spring. 4 credits maximum. S-U grades optional. 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.

FD SC 695 Current Readings in Food Science
Fall and spring. 1 credit. Prerequisite: 500-level course or permission of the instructor. Letter grades only. Lect., 1 hour per week. Staff.
A 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 (but are not limited to) Food Microbiology and Food Safety; Food Chemistry; Packaging; Food Engineering. This course can be taken multiple times. Graduate students in Food Science are strongly encouraged to enroll in this course. Undergraduates should contact the designated instructor(s) for each term.

FD SC 698 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 faculty members. The experience may include leading discussion sections, preparing, assisting in, or teaching lectures and laboratories, and tutoring.

FD SC 800 Masters-Level Thesis Research
Fall or spring. Credit. TBA. Maximum of 12 credits. Limited to master's candidates; by permission of Special Committee chair. S-U grades only. Graduate faculty.

FD SC 900 Graduate-Level Thesis Research
Fall or spring. Credit. TBA. Maximum of 12 credits. Limited to doctoral students who have not passed the "A" exam; by permission of Special Committee chair. S-U grades only. Graduate faculty.

FD SC 901 Doctoral-Level Thesis Research
Fall or spring. Credit. TBA. Maximum of 12 credits. Limited to doctoral students who have not passed the "A" exam; by permission of Special Committee chair. S-U grades only. Graduate faculty.

HORT 101 Horticultural Science and Systems
Fall. 4 credits. Lec., M W F 9:05; lab, W 1:25-4:25, T. A. M. Merwin.
The 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 201 The Art of Horticulture I: Plants and Gardens as a Subject of Art
Fall. 2 credits. Studio, T 1:25-4:25. M. Eames-Sheavy.
Part of a HORT 201 and 203 sequence, this experiential course will consider plants and gardens as a subject of art. Students will explore basic drawing techniques, botanical-illustration methods, watercolor, and photography. The course will address the natural history and symbolic use of plants in fine art. Students will critically reflect on course content in journals and explore the work of garden writers.

HORT 203 The Art of Horticulture II: Plants Used in Art or as Artforms
Part of a HORT 201 and 203 sequence, this experiential course will focus on plant materials used to create art or manipulated as artforms. It will acquaint students with a range of topics such as the use of plants in fibers and dyes, floral design, and living-sculpture practices such as topiary, bonsai, turfworks, and tree sculpture. Students will create a final project focused on these or related methods.

HORT 215 Sophomore Seminar: Nonfiction Adventure Writing: Reclaiming the Scientist's Voice
Spring. 4 credits. Lec., TBA. Letter only. T. H. Whitlow.
Using juxtaposed readings drawn from the published chronicles of scientific and nonscientific adventures, the class discovers strategies for conveying excitement in their own writing. In addition to classroom discussion, group adventures in the field and lab provide raw material for writing individual narratives. Each student has opportunities to cultivate individual awareness of natural processes and recount their discoveries in writing.

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...
HORT 225 Vegetable Production
Fall. 4 credits. Prerequisite: BIOPL 241 or an equivalent course approved by instructor. Letter grade only. Offered odd years. Lec, T R 11:00–12:30; lab, R 1:25–4:25. 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. Information is applicable to various kinds of agricultural and horticultural seeds. Hands-on laboratory experience.

HORT 230 Turfgrass Management
Fall. 4 credits. Prerequisite: CSS 260 or permission of instructor. Lab, M W F 11:15; lab, F 1:25–4:25. A. M. Petrovic. Study of the scientific principles involved in the management of golf courses, athletic fields, parks and industrial grounds, and commercial sod production. Considerations given to principles of establishment, mowing, irrigation, growth and development, species selection, pest management, and nutrition in the management of turfgrass sites.

HORT 243 Taxonomy of Cultivated Plants
Fall. 4 credits. Prerequisite: 1 year of introductory biology or written permission of instructor. May not be taken for credit after BIOPL 248. Lec, M W F 10:10–11:00; lab, M or W 2:00–4:25. Offered even years. A 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 taxa used 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.

HORT 300 Herbaceous Plant Materials
Fall. 3 credits. Fee for field trip $57. Lec, T R 10:10, lab, T 2:00–4:25. W. B. Miller. Identification 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 301 Plants for Interiors
Spring. 3 credits. Lec, M W F, lab, M W F. Offered even years. T. C. Weiler. Study of plants for interiors: identification, design characteristics, and cultural requirements; use of plants as elements of planting design (trees, shrubs, groundcovers, and other herbaceous flowering plants and cut flowers); the interior landscape industry (organization, bidding, installation, maintenance). Required three-day field trip: estimated cost, $130.

HORT 310 Production and Marketing of Greenhouse Crops
Spring. 4 credits. Letter grade only. Lec, T R 10:10–11:20; lab, R 1:25–4:25. Offered odd years. T. C. Weiler. Covers basics of establishing a greenhouse operation, growing crops in optimized environments, and serving niche or mass markets. The course discusses technology basics including structures and equipment, systems for heating and cooling, lighting, irrigating and fertilizing, materials handling; environmental control and integrated pest management; and production management. Also covered are world centers of greenhouse crop production; culture of cut, pot, bedding, vegetable, and fruit crops in greenhouses, emphasizing productive harvesting through environmental, physical, and chemical management of growth and development. Each student grows one or more crops. Required three-day field trip, estimated cost, $130.

HORT 317 Seed Science and Technology
Fall. 3 credits. Prerequisites: BIOPL 241 or an equivalent course approved by instructor. Letter grade only. Offered odd years. Lec, T R 11:40–12:30; lab, R 1:25–4:25. 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. Information is applicable to various kinds of agricultural and horticultural seeds. Hands-on laboratory experience.

HORT 320 Woody Plant Identification and Use I
Fall. 2 credits. Prerequisite: permission of instructor. Letter grade only. Lab, R 12:20–1:10; lab, R 1:25–4:25. N. L. Bassuk. This course module of HORT/LA 491 covers the identification of approximately 200 woody trees, shrubs, and vines in leaf and their use in the landscape. Students desiring a more comprehensive course that covers site assessment, soil modification, design, plant specifications and landscape establishment: principals and techniques should take HORT/LA 491 or the 491–492 sequence. Limited number of places available.

HORT 322 Woody Plant Identification and Use II
Spring. 2 credits. Prerequisite: permission of instructor. Letter grade only. Lab, R 12:20–1:10; lab, R 1:25–4:25. N. L. Bassuk. This module of HORT/LA 492 covers the identification of approximately 160 evergreen trees and shrubs and deciduous plants using winter identification. HORT 391 (fall module) need not be taken before taking HORT 392 (spring module). Students also assist in the establishment of a new landscape on campus. Limited number of places available.

HORT 400 Principles of Plant Propagation
Fall. 3 credits. Prerequisites: BIOPL 242 and 244 or another course in plant physiology. Lec, T R 9:05; lab, R 1:25–4:25. K. W. Mudge. Sexual (seed) propagation and asexual (vegetative) propagation including cut, grafting, tissue culture, layering, and specialized vegetative reproductive structures. Physiological, environmental, and anatomical principles and industry applications are stressed in lecture, and hands-on skills in laboratories on campus and at the Grove. Students will actively take part in the extension site. Hands-on activities will include all or most of the following: temperate-nut harvest and variety evaluation, mushroom cultivation, small fruit and herb culture, medicinal-herb culture, site evaluation and planning, and field trips to other agroforestry-related sites. Outdoor activities will be integrated with selected readings via an online discussion board.

HORT 401 The How, When, and Why of Grafting—A Distance Learning Approach
Spring. 2 credits. Lec: autotutorial (web); lab: greenhouse/autotutorial (web/cd); discussion: web. One introductory face-to-face meeting. TBA. K. W. Mudge. A ten-week, web/CD-based autotutorial approach to the principles and practices of grafting and budding as applied to plant propagation. Emphasis is on the role of grafting in modern horticultural practice and on student development of hands-on grafting skills. Instruction involves web-based asynchronous presentation of lecture and lab materials (web/CD-ROM), asynchronous discussion, and autotutorial hands-on grafting lab exercises.

HORT 420 Principles of Nursery-Crop Production
Fall. 4 credits. Prerequisite: HORT 400. Lec, M W F 9:05–9:55; lab, M 2:00–4:25. Field trips. Offered odd years. G. L. Good. Principles of commercial production of nursery crops to marketable stage, including postharvest handling and storage. Term project required. Field trips are made to commercial nurseries.

HORT 425 Postharvest Biology of Horticultural Crops
Fall. 3 credits. Lec, M W F 9:05–9:55; lab, W 1:25–4:25. Offered even years. S. Gan. A study of the biological processes controlling physical and chemical changes in harvested yet living horticultural crops or their parts. The theoretical principles and fundamental processes underlying these changes will be discussed. Strategies and practical handling requirements/conditions for storage, transportation, and quality monitoring of harvested horticultural crops will also be discussed.

HORT 426 Practicum in Forest Farming as an Agroforestry System
Fall. 2 credits. Prerequisite: junior, senior, or graduate standing; or permission of instructor. Lab, W 1:25–4:25. K. W. Mudge and L. E. Buck. Students will actively take part in the development and management of a seventy-year-old nut grove originally planted at Cornell in the 1930s. The MacDaniels Nut Grove is being developed as a multipurpose forest-farming teaching, research, and extension site. Hands-on activities will include all or most of the following: temperate-nut harvest and variety evaluation, mushroom cultivation, small fruit and herb culture, medicinal-herb culture, site evaluation and planning, and field trips to other agroforestry-related sites. Outdoor activities will be integrated with selected readings via an online discussion board.

HORT 435 The Care of Woody and Herbaceous Plants in the Landscape
Fall. Weeks 1–10. 5 credits. Prerequisites: upper division or graduate standing and permission of instructor. Letter grade only. Lec, T R 8:40–9:55; lab, F 12:30–4:45, plus several weekends. T. H. Whillow.
This course draws concepts from ecology, hydrology, soil science, and conservation biology and applies these in both principle and practice to the rapidly evolving field of restoration ecology. Through lectures, reading, and discussion, site visits to active restoration sites, and a real world class project, students learn and practice skills needed to develop restoration plans for a variety of situations.

HORT 442 Berry Crops: Culture and Management
Fall. 3 credits. Lecs, M W 9:05; lab, M 1:25–4:25. Offered even years. M. P. Pruits. This course draws concepts from ecology, hydrology, soil science and conservation biology and applies these in both principle and practice to the rapidly evolving field of restoration ecology. Through lectures, reading and discussion, site visits to active restoration sites and a real world class project, students learn and practice skills needed to develop restoration plans for a variety of situations.

HORT 443 Viticulture and Vineyard Management-I
Fall. 3 credits. Prerequisites: BIOG 101/103, BIOG 102/104, BIOL 241, CSS 200, WRT 111, or equivalents. Letter grade only. Lecs, T R 9:05; lab, R 1:25–4:25. R. M. Pool, A. N. Lakso, and M. C. Gottlin. First-quarter 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 decisions. Laboratory exercises and field trips offer hands-on experience.

HORT 444 Viticulture and Vineyard Management—II
Spring. 3 credits. Prerequisites: HORT 443 and BIOL 242 (may be taken concurrently) or equivalent. Letter grade only. Lecs, T R 9:05; lab, R 1:25–4:25. R. M. Pool, B. I. Reichs, P. Cousins, and C. Owens. Second-quarter 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 445 Ecological Orchard Management
Spring. 3 credits. Prerequisite: introductory biology. S-U grades optional. Lecs, T R 10:10; lab, T 1:25–4:25. Offered every years. J. A. Merwin. The ecology and technology of deciduous tree-fruit production. Topics include basic tree and fruit physiology, orchard renovation and design systems; nutrition, irrigation, and freeze protection practices; tree pruning and training, post-harvest fruit storage; marketing and economic spreadsheet models; monitoring and decision-making systems for integrated pest management; and efficient use of orchard equipment. Emphasis is on the agroecology of perennial crop systems, with labs providing hands-on experience in orchard management. Previous coursework in horticulture and other plant sciences is suggested.

HORT 449 Green Signals and Triggers—The Plant Hormones (also BIOL 449)
Fall. 1 credit. Prerequisites: introductory biology course and BIOL 242 or S-U grades optional. Lecs, F 1:25–2:15. Offered odd years. P. J. Davies. A study of the plant hormones and how they regulate plant growth and development. Topics included: discovery role in growth and development, mode of action, and practical uses of the plant hormones auxin, gibberellins, cytokinins, abscisic acid, ethylene, and brassinosteroids.

HORT 455 Mineral Nutrition of Crops and Landscape Plants (also CSS 455)
Spring. 3–5 credits. Prerequisite: CSS 260 and BIOL 242, or equivalent. Lecs, M W F 9:05, lab, R 2:00–4:25. Offered every years. H. C. Wien and staff. A modular course on principles of plant mineral nutrition and nutrient management. A mandatory module on principles is followed by others on agronomic crops, vegetables, floriculture, and fruit crops. Each module carries one credit; a minimum of three credits must be taken in one semester. By the end of the course, students develop an understanding of principles of mineral nutrient function in crop plants, are able to diagnose deficiencies by symptoms and tissue tests, and can devise organic and conventional nutrient management schemes that maximize productivity and mineral nutrient quality.

HORT 460 Plant-Plant Interactions
Spring. 3 credits. Prerequisite: any crop production or plant ecology course or permission of instructor. Lecs, T R 9:05; lab/disc, M 2:00–4:25. Offered every years. D. W. Wolfe. This course utilizes our basic understanding of plant ecology and physiology to evaluate the mechanisms by which plants perceive "neighbors" and compete or positively interact with each other in natural and managed ecosystems. This is done by first-hand experience in techniques such as isolation of allelochemicals and determination of weed thresholds.

HORT 462 Physiology of Vegetables and Flowers
Spring. 4 credits. Prerequisite: BIOL 242 or its equivalent. Lecs, M W F 9:05; lab/disc, M 2:00–4:25. Offered odd years. H. C. Wien. Study of the physiological principles that govern growth, development, and production of reproductive structures of vegetable crops and herbaceous ornamental plants. Processes of flower induction, fruit and seed set, and the balance of vegetative and reproductive growth, especially in perennials, are emphasized. Practical hands-on greenhouse experiments and small group discussions illustrate the lecture material.

HORT 466 Soil Ecology (also CSS 466)
Spring. 4 credits. Prerequisites: one year of biology, ecology, and CSS 260 or permission of instructor. Lecs, T R 10:10–11:25; lab, W 1:25–4:25. J. E. Thies and L. F. Drinkwater. Surveys the diversity of soil organisms and their roles in terrestrial ecosystems. The course covers the fundamental principles and features of biologically mediated processes in the soil and the function of soil organisms in the wider context of both managed and unmanaged ecosystems. The role of plant-microbe interactions in shaping the larger ecosystem will serve as the basis for comparing soil community structure and function across a variety of ecosystems. The class investigating the consequences of anthropogenic activities from local soil management to global change on soil biodiversity and microbially mediated soil processes. In the laboratory, students explore an array of methods for assessing soil biological community composition and microbially mediated processes in soil.

HORT 475 Golf Course Management
Fall. 2 credits. Prerequisite: HORT 330 or equivalent. Lecs, F 1:25–4:25. Offered odd years. A. M. Petrovic. Advanced study in the management of golf course operations including watersheds on root zone materials, fertilization practices, integrated pest management practices, irrigation systems, environmentally based decision making, personnel management, and financial operations. Analysis of a central New York golf course provides the basis for discussion.

HORT 476 Practical Problem Solving Skills in Horticulture
Fall. 2 credits. Prerequisite: permission of instructor. Minimum class size for semester is 8 students. Lecs, W 1:25–4:25. Offered every years. C. P. Mazza. Foundation for extension or similar career-oriented students. Application of horticultural science principles to practical situations faced primarily by home gardeners. Techniques of synthesizing information from various scientific disciplines and strong emphasis on communications skills. Classes led by staff members in several departments. Topics are interdisciplinary and oriented to students majoring in horticultural science (landscape and food), entomology, plant pathology, natural resources, and Cornell Plantations.

HORT 480 Plantations Lecture Series
Fall. 1 credit. S-U grade only. W 7:30-8:45. D. A. Rikowsky. A twelve-week course consisting of an introductory class, ten lectures, and a final evaluation session. Each week, lectures feature prominent speakers on a broad range of popular horticultural, natural-science, and human-cultural themes.

HORT 485 Public Garden Management
Spring. 3 credits. Prerequisites: HORT 300 or HORT 301. Lecs, T R 10:10–11:00; lab, R 11:15–12:05. Two-and-a-half-day field trip to visit other botanical gardens and arboretum. Offered odd years. D. A. Rikowsky and S. M. Skelley. The course explores the history of public gardens, types of contemporary public gardens, and the operation of botanical gardens and arboretum. Included are separate units on: collections curation, design of collections, management of landscapes and natural areas, educational programming, interpretive programs, research, financial management, and staffing.
HORT 491 Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment (also LA 491)
Fall. 4 credits. Prerequisites: major in horticulture or landscape architecture or permission of instructor. Limited to 48 students. Preregistration required. Lec, T R 12:20-1:10; Lab, T R 1:25-4:25. N. L. Bassuk and P. J. Trowbridge.
This course 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 492 Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment (also LA 492)
The second half of this course continues focus 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 preparation 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. Attendance limited to horticulture and landscape architecture majors or permission of the instructors.

HORT 494 Special Topics in Horticulture
Fall or spring. 4 credits maximum. S-U grades optional. Staff. The department teaches "trial" courses under this number. Offerings may vary by semester, and will be advertised before the semester begins. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

HORT 495 Undergraduate Seminar—Current Topics in Horticulture
Fall or spring. 4 credits. S-U grades only. M 11:15-12:05. L. Cheng.
Undergraduate participation in weekly departmental seminar series. Graduate students should enroll in HORT 600. May be taken four times for one credit per semester.

HORT 496 Internship in Horticulture
Fall or spring. Credit variable. S-U grades optional. Prerequisite: permission of student's advisor in advance of participation in internship programs. Students must register using an Independent Study form (available in 140 Roberts Hall) signed by the faculty member who will supervise their study and assign their grade. Staff.

HORT 497 Independent Study in Horticulture
Fall or spring. Credit variable. S-U grades optional. Prerequisites: permission of instructor(s). Students must register using an Independent Study form (available in 140 Roberts Hall). Independent study in horticultural sciences under the supervision of departmental faculty members. This experience may include leading discussion sections; preparing, assisting in, or teaching laboratories; and tutoring.

HORT 498 Undergraduate Teaching Experience
Fall or spring. Credit variable. S-U grades optional. Prerequisites: previous enrollment in course to be taught or equivalent, and written permission of the instructor. Students must register using an Independent Study form (available in 140 Roberts Hall). Design the course to give qualified undergraduate students teaching experience through actual involvement in planning and teaching horticultural sciences courses under the supervision of departmental faculty members. This experience may include leading discussion sections; preparing, assisting in, or teaching laboratories; and tutoring.

HORT 499 Undergraduate Research
Fall or spring. Credit variable. S-U grades optional. Prerequisites: permission of instructor. Students must register using an Independent Study form (available in 140 Roberts Hall). Staff. Undergraduate research projects in horticultural sciences.

HORT 500 Master of Professional Studies (Agriculture) Project
Fall or spring. 1-6 credits. 6 credits maximum toward M.P.S. (Agriculture) degree. S-U grades optional. Staff. A comprehensive research project emphasizing the application of principles and practices to professional horticultural teaching, extension, and research programs and situations. Required of M.P.S. (Agriculture) candidates in the respective graduate fields of horticulture.

HORT 600 Seminar in Horticulture
Fall and spring. 1 credit. S-U grades only. M 11:15-12:05. L. Cheng.
Weekly seminars consist of graduate student research project reports, faculty research topics, as well as guest speakers from other universities and/or industry. Required of graduate students majoring or minoring in horticulture. Undergraduate students register under HORT 495.

HORT 615 Quantitative Methods in Horticultural Research
Spring. Weeks 1-7. 2 credits. Prerequisite: BTRY 601, BTRY 602 or permission of instructor. S-U grades only. W F 2:30-4:25. D. W. Wolfe.
This course provides experience in applying statistical principles to real-world agricultural research problems. Examples of lab, greenhouse, and field studies from the published literature are utilized. Other quantitative methods are explored. Topics include approaches to controlling and analyzing 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 617 Advanced Analytical Methods for Plant Systems
Spring. 3 credits. Prerequisite: one year of general chemistry, organic chemistry, plant physiology. Letter grade only. Lec, T R 12:20-3:20, lab, T R 1:25-4:25. Offered every year. L. A. Weston and staff.
Principles and practical applications of selected laboratory methods in the plant and environmental sciences. Enhancement of laboratory techniques and problem-solving skills will be emphasized. Suitability of various procedures for measuring important plant and soil components will be discussed. Analytical techniques will be chosen from: ICP spectroscopy, elemental analysis by combustion or flow analysis, gas chromatography, HPLC, electrophoresis, chemical assay, biochemical assays, and mass spectrometry.

HORT 618 Breeding for Pest Resistance (also PL BR 618)
Fall. 2 credits. Letter grade only. Prerequisites: BIOGD 281 and PL HR 403 or equivalents. An introductory course in plant pathology and/or entomology also highly recommended. Offered every year. Lec, M 2:30-4:25. P. D. Griffiths.
For description, see PL BR 618.

HORT 620 Woody Plant Physiology
Spring. 4 credits. BIOP 331, BIOP 337, or equivalent, or permission of instructor. Letter grade only. Lecs, T R 8:40-9:55, lab, T 1:25-4:25. T. H. Whitlow.
An introduction to the physiological and biochemical aspects of growth and maturation in woody plants emphasizing whole plant integration and how these processes affect plant growth under both natural and cropping systems. Topics include evolution of woody plant form, structure and function, the root and shoot, growth periodicity, dormancy, growth analysis, carbon balance and allocation, root symbioses, and physiological responses to biotic and abiotic stress. Faculty members from the Geneva Experiment Station and the Department of Horticulture collaborate in teaching.

HORT 625 Advanced Postharvest Biology
Fall. Variable 1-3 credits. TBA.
Section 01 Advanced Postharvest Physiology. 1 credit. (12 lecs); S. Gan.
Emphasis on the physiological and biochemical aspects of growth and maturation, ripening, and senescence of harvested horticultural plant parts.

Section 02 Plant Senescence (also BIO PL 653,06). 1 credit. (12 lecs); S. Gan.
Introduces molecular, genetics, and genomics approaches in plant senescence and postharvest research. Topics include gene expression, regulation, and function associated with physiological and biochemical changes in senescing, maturing, and/or ripening plants or parts. Genetic manipulation of senescence/ripening processes will also be discussed.
INTERNATIONAL AGRICULTURE AND RURAL DEVELOPMENT

Note: the course prefixes were previously listed as INTAG.

IARD 300 Perspectives in International Agriculture and Rural Development
Fall. 2 credits. R. W. Everett. A forum to discuss both contemporary and future world food issues and the need for an integrated, multidisciplinary team approach in helping farmers and rural development planners adjust to the ever-changing food needs of the world.

IARD 314 Tropical Cropping Systems: Biodiversity, Social, and Environmental Impacts (also CSS 314)
Fall. 3 credits. Prerequisite: an introductory course in crop science, soil science, or biology or permission of instructor. P. Hobbs. Characterization and discussion of traditional shifting cultivation, lowland rice-based systems, upland rice-based systems, smallholder mixed farming including root crops and livestock, plantation fruit and oil crop systems, and agroforestry. In addition to species diversity and domestication, factors such as climate, land quality, soil management, land tenure, labor, and markets are considered. The effect of tropical cropping systems on the environment is evaluated.

IARD 402 Agriculture in the Developing Nations I (also FD SC 402)
Fall. 2 credits. K. V. Raman and W. R. Coffman. The goal of this course is to acquaint students with the major issues and problems in international agriculture and rural development and to show how problems in development are being addressed by international, government, and nongovernment agencies. The lectures/discussions attempt to establish the global context for sustainable agricultural development and focus on agriculture and rural development in the tropics, using case studies. This course may be taken as a stand-alone survey course in international agriculture, but it is also the preparatory course for participation in Agriculture in the Developing Nations II (IARD 602), which includes a trip to a developing country during the intersession.

IARD 403 Traditional Agriculture in Developing Countries
Fall. 1 credit. S-U only. Staff. Today, perhaps more than half of the world's arable land is farmed by traditional farmers. They developed sustainable agriculture practices that allowed them to produce food and fiber for millennia with few outside inputs. Many of these practices have been forgotten in developed countries but are still used by many traditional, subsistence, or partially subsistence farmers in developing countries. The course examines traditional systems from several disciplinary points of view.

IARD 404 Crop Evolution, Domestication, and Diversity (also PL BR 404, BIOPL 404)
Spring. 2 credits. Prerequisite: BIOGD 281 or PL BR 225 or permission of instructor. 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. Underlying ethical, legal, and social issues affecting conservation and use also are addressed.

IARD 480 Global Seminar: Building Sustainable Environments and Secure Food Systems for a Modern World (also NTRES 480 and FD SC 480)
Spring. 1-3 credits. For juniors, seniors, and graduate students. Letter grade. J. Lassoe and D. Miller. For description, see NTRES 480.

IARD 494 Special Topics in International Agriculture (also IARD 694)
Fall, spring. 1-3 credits. S-U grades optional. Staff. The department teaches "trial" courses, and special topics not covered in other courses, at the undergraduate level. Under this number, offerings vary by semester, and will be advertised by the department. Courses offered under the number are approved by the department curriculum committee, and the same course is not offered more than twice under this number.

IARD 496 International Internship
Fall, spring. 1-6 credits. See CALS internship policy guidelines and submit approved internship form prior to enrollment. S-U grades optional. Staff. An 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 researching 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.

IARD 497 Independent Study in IARD
Fall and spring. 1-3 credits. S-U or letter grade. Prerequisites: permission of instructor and signed Independent Study form. Staff. Independent Study in IARD 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 598 International Development M.P.S. Project Paper
Fall and spring. 1-6 credits. (A maximum of 6 credits may be applied toward M.P.S. degree requirements). Limited to M.P.S. candidates in the field of International Development (ID). S-U grades only. N. Uphoff. A 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 599 International Agriculture and Rural Development M.P.S. Project Paper
Fall and spring. 1-6 credits. (A maximum of 6 credits may be applied toward M.P.S. degree requirements). Limited to M.P.S. candidates in the field of International Agriculture and Rural Development (IARD). S-U grades only. S. Kyle. A 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 602 Agriculture in the Developing Nations II (also FD SC 602)
Spring. 3 credits. Prerequisites: IARD 402 and (or) permission of instructors. Field trip to India during January intersession. Note: cost of January 2005 field-study trip is approx. $2,500, which includes airfare, board, and lodging (some merit- and need-based financial aid may be available). T R 2:30-4:25 until midterm only. K. V. Raman and W. R. Coffman. Oriented to provide students an opportunity to observe agricultural development in a tropical environment and promote interdisciplinary exchange among staff members and students. The two-week overseas field-study trip to India, during January, is followed by discussions and assignments dealing with problems in food, agriculture and livestock production in the context of social and economic conditions.

IARD 603 Administration of Agricultural and Rural Development (also GOVT 692)
Spring. 4 credits. N. T. Uphoff and T. W. Tucker. An intercollege course designed to provide graduate students with a multidisciplinary perspective on the administration of agricultural and rural development activities in developing countries. The course is oriented to students in agricultural or social sciences who may have administrative responsibilities during their professional careers.

IARD 612 Patents, Plants, and Profits: Intellectual Property Management for Scientists and Entrepreneurs (also PL BR 612)
Spring. 2 credits. Prerequisite: open to graduate students and to senior undergraduates. S-U grades optional. A. F. Katttiger, M. A. Mutschler, R. Potter, and R. D. Kryder. For description, see PL BR 612.

IARD 620 Rural Livelihoods and Biological Resources: Technologies and Institutions
Fall, spring. 2 credits. Biweekly, TBA. C. Barrett, A. Pell, and E. Fernandes. This seminar explores issues that straddle the boundaries of the biological and social sciences as they relate to rural livelihoods, food security, and the management of biological resources. Students taking the 1-credit option participate in seminars and panels. Students taking the 2-credit option must also participate in a group project.

IARD 685 Training and Development: Theory and Practice (also EDUC 685)
Spring. 4 credits. S-U grades optional. M. Kroma. Analysis, design, and administration of training programs for the development of human resources in small-farm agriculture, rural health and nutrition, literacy as nonformal education, and general community development. Designed for scientists, administrators, educator-trainers, and social organizers in rural and agricultural development programs in the United States and abroad.

IARD 694 Graduate Special Topics in IARD
Fall or spring. 1-4 credits. S-U or letter option. 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 696 Agroecological Perspectives for Sustainable Development (also NTR E 698 and CSS 696)
Fall, spring. 1 credit. S-U grades only. E. Fernandes, L. Fisher, L. Buck. 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 697-698 International Development M.P.S. Seminar
Fall, spring. 1 credit. S-U only. N. Uphoff. A seminar for M.P.S. students to discuss important issues in international development and to prepare them to write their project papers. Specific content varies.

IARD 699 International Agriculture and Rural Development M.P.S. Project Seminar
Fall, spring. 1 credit. S-U grade only. Required for, and limited to, M.P.S. IARD students or with permission of instructor. S. C. Kyle. The seminar provides students with the opportunity to develop and present their special projects. It also serves as a forum for discussion of current issues in low-income agricultural and rural development, with particular attention to interdisciplinary complexities.

IARD 783 Farmer-Centered Research and Extension (also EDUC 783)
Fall. 3 credits. S-U or letter option. M. Kroma and T. Tucker. This course provides an introduction to participatory traditions in farming systems research, extension, evaluation of rural development, technology generation, gender analysis, participatory rural appraisal, and documentation of local and indigenous knowledge of community-based development. Case studies of farmer-centered research and extension provide a focus for analysis. Appropriate roles of researchers and extensionists as partners with farmers are examined. A major contribution of farmer-centered research and extensions is its potential to legitimize people's knowledge by enhancing their capacity to critically analyze their own problems, to conduct their own research, and to empower them to take direct action to solve those problems.

Related Courses in Other Departments
In addition to International Agriculture and Rural Development (IARD) courses, many other courses have an international focus. The following are suggested relevant courses:

Applied Economics and Management
International Trade and Monetary Economics (AEM 230)
*Global Agribusiness Management (AEM 329)
International Trade Policy (AEM 430)
*Food Marketing Colloquium (AEM 446/447)

Global Marketing Strategy (AEM 449)
Seminar on Agricultural Trade Policy (AEM 730)

Agriculture and Life Sciences
*Agroecology Study Tour to Burgundy, France (ALS 402)
*Internship Opportunities in Burgundy, France (ALS 403)
Global Seminar (NTRES 480/FD SC 480/IARD 480)

Animal Science
Tropical Livestock Production (AN SC 400)
Tropical Forages (AN SC 403)

Asian Studies
Southeast Asia Seminar: Country Seminar (ASIAN 601)

Biology
*Biological Neotropics (BIOEE 405)
Food, Agriculture, and Society (BIOEE 469)
The Healing Forest (BI0EE 348)

Communication
Communication in the Developing Nations (COMM 424)

City and Regional Planning
Seminar in International Planning (CRP 671)
Seminar in Project Planning in Developing Countries (CRP 675)

Crop and Soil Science
Properties and Appraisal of Soils of the Tropics (CSS 471)
Ecology of Agricultural Systems (CSS 473)
Tropical Cropping Systems (CSS/IARD 314)

Development Sociology
Comparative Issues in Social Stratification (D SOC 370)
Education, Inequality, and Development (D SOC 305)
International Development (D SOC 205)
Population Dynamics (D SOC 201)
Population, Environment, and Development in Sub-Saharan Africa (D SOC 495)
Population Policy (D SOC 418)
Migration and Population Redistribution (D SOC 430)
Social Impact of Resource Development (D SOC 440)
Social Indicators, Data Management, and Analysis (D SOC 213)
Sociological Theories of Development (D SOC 606)
Sustainable Development (D SOC 261)
The Sociology of "Third World" States (D SOC 725)
INFO 295 Mathematical Models for Information Science
Fall. 4 credits. Corequisite: MATH 231 or equivalent.

INFO 330 Applied Database Systems (also COM S 330)
Fall. 3 credits. Prerequisites: COM S 211/ENGRD 211.

INFO 345 Human-Computer Interaction Design (also COMM 345)
Spring. 3 credits.

INFO 349 Media Technologies (also S&TS 349)
Spring. 3 credits.

INFO 355 Computers: From Babbage to Gates (also S&TS 355)
Spring. 4 credits.

INFO 387 The Automatic Lifestyle: Consumer Culture and Technology (also S&TS 387)
Spring. 4 credits. Not offered spring 2005.

INFO 430 Information Retrieval (also COM S 430)
Fall. 3 credits. Prerequisite: COM S 211/ENGRD 211 or equivalent.

INFO 431 Web Information Systems (also COM S 431)
Spring. 3 credits. Prerequisites: COM S 211 and some familiarity with the technology of web sites.

INFO 435 Seminar on Applications of Information Science (also INFO 635)
Spring. 3 credits. Prerequisites: background in computing, data structures, and programming at the level of COM S 211 or equivalent, and experience in using information systems.

INFO 440 Advanced Human-Computer Interaction Design (also COMM 440)
Fall. 3 credits.

INFO 447 Social and Economic Data (also ILR 447)
Spring. 4 credits. Prerequisites: one semester of calculus, the IS statistics requirement, at least one upper-level social science course, or permission of the instructor.

INFO 450 Language and Technology (also COMM 450)
Spring. 3 credits.

INFO 490 Independent Reading and Research
Fall, spring 1–4 credits. Independent reading and research for undergraduates.

INFO 491 Teaching in Information Science, Systems, and Technology
Fall, spring. Variable credit.
This course involves working as a TA in a course in the Information Science, Systems, and Technology major.

INFO 515 Culture, Law, and Politics of the Internet
Fall. 4 credits.

INFO 530 The Architecture of Large-Scale Information Systems (also COM S 530)
Fall. 4 credits. Prerequisites: COM S/INFO 330 or COM S 432.

INFO 614 Cognitive Psychology (also PSYCH 614)
Fall. 5 credits. S. Edelman.
This course consists of two components: PSYCH 214 (3 credits) and COGST 501 (2 credits). It is intended for graduate students; undergraduates opting for 5 credits should enroll simultaneously in PSYCH 214 and COGST 501.

INFO 630 Representing and Accessing Digital Information (also COM S 630)
Fall. 4 credits. Prerequisites: COM S 472 or 478 or 578 or the equivalent.

INFO 634 Information Technology in Sociocultural Context (also S&TS 634)
Fall. 4 credits. Prerequisite: permission of instructor.

INFO 635 Seminar on Applications of Information Science (also INFO 435)
Spring. 3 credits. Prerequisites: background in computing, data structures, and programming at the level of COM S 211 or equivalent, and experience in using information systems. Undergraduates and master's students should register for INFO 435. Ph.D. students should register for INFO 635.

INFO 640 Human-Computer Interaction Design (also COMM 640)
Fall. 3 credits. Prerequisites: graduate standing or permission of instructor.

INFO 685 The Structure of Information Networks (also COM S 685)
Spring. 4 credits. Prerequisite: COM S 482.

LANDSCAPE ARCHITECTURE

LA 140 The Symbols of New York State's Cultural Landscape
Spring. 3 credits.
Lectures with slides and other media illustrate how successive waves of New Yorkers continually defined and redefined their sense of place and “the power of place” by references to natural symbols such as Niagara Falls and to human constructions such as towns of Iroquois long houses and cities of skyscrapers.

LA 141 Grounding in Landscape Architecture
Fall. 4 credits. Limited to 15 students. Letter grade only. Required drafting equipment plus materials for projects will cost about $250.
Introductions to the representation and design of landscapes and to working in a studio setting. Freehand drawing, measured drawing, and model making are used to understand design principles of the changing landscape.

LA 142 Grounding in Landscape Architecture
Spring. 4 credits. Limited to approximately 20 students; freshman landscape architecture majors or permission of instructor. Required drafting equipment and project supplies will cost about $250.
Fundamentals of landscape design applied 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 155 American Indian Cultural Landscapes: Changes in Time
Fall. 3 credits. Lectures with videos and other media illustrate American Indian cultures and philosophies both before and after 1492. A major focus is how all Indian societies, from hunting societies to agricultural communities, continually transformed their cultural landscapes. Lectures also include how European expansion forcefully transformed American Indian cultural landscapes.

LA 201 Medium of the Landscape
Fall. 5 credits. Limited to landscape architecture majors. Required drafting equipment, supplies, and fees will cost about $250; expenses for the field trip will be about $250.

This studio course emphasizes 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 202 Medium of the Landscape
Spring. 5 credits. Prerequisite: LA 201 with a grade of C or better. The cost of supplies and fees will be about $250; expenses for the field trip will be about $250.

This course focuses on the role of materials in design, design theory, and design vocabulary associated with landscape architecture projects.

LA 215 Sophomore Seminar: Engaging Places
Fall. 4 credits. Lec., M W 2:55-4:10.

A. Hammer.

Engaging Places explores how places come to be what they are, how they shape—and are shaped by—the people who live in them, how they become coordinates for plotting both a culture's biography and the meaning of a life. Within 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 260 Pre-Industrial Cities and Towns of North America (also CRP 360 and LA 366)
Fall. 3 credits. Offered fall 2005.

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 261 Fieldwork in Urban Archaeology (also CRP 261 and AIS 261)
Fall. 4 credits.

Urban archaeologists study American Indian, colonial, and nineteenth-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. Three 8-hour Saturday field labs are required; students choose three labs from seven that are offered.

LA 262 Laboratory in Landscape Archaeology (also CRP 262)
Spring. 3 credits. Prerequisites: LA 261 or CRP 261 with consent of instructor.

Various American Indian civilizations and European cultures have all 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 263/547 American Indians, Planners, and Public Policy (also CRP 363/547)
Spring. 3 credits. Offered in alternate years. Offered spring 2006.

Decisions made by public agencies and private enterprise too often lead to the flooding, polluting, strip-mining, or other destruction of American Indian reservations, archaeological sites, and burial grounds. The central focus of this course is how to address urban and regional problems without imperiling the cultural survival of minorities.

LA 266 Jerusalem through the Ages (also NES 266, JST 266, ARKEO 266, RELST 266)
Fall. 5 credits.

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 Jewish, Hasmonean, Roman, Byzantine, Umayyad, Seljuk, Crusader, Mamluk, and Ottoman eras. Students examine the original historical sources (e.g., Bible, Josephus, and the Madaba map) that pertain to Jerusalem. Slides and videos will be used to illustrate the natural features, human-built monuments, and artifacts that flesh out the textual material, providing a fuller image of the world's most prominent spiritual and secular capital.

LA 282 The American Landscape
Fall. 3 credits.

An interdisciplinary study of the environmental and cultural history of the American landscape. Topics include the relation of landscape to culture, landscape use and ecological change, regional and national landscapes, and perceptions of landscape expressed in paintings, photographs, and literature.

LA 301 Integrating Theory and Practice I
Fall. 5 credits. Prerequisite: LA 202 with a grade of C or better. Cost of supplies and fees, about $250; expenses for field trip, about $250.

Course participants are engaged in the art and science of design. This includes relating construction and planting details to concepts and program. The studio focuses on site-scale projects that consider significant cultural and natural landscapes. Theories of landscape restoration, sustainable design, and landscape representation are explored through projects that derive form from site and place.

LA 302 Integrating Theory and Practice II
Spring. 5 credits. Cost of supplies and fees, about $250; basic expenses for field trip, about $250.

The studio focuses on the expression of design solutions that grow from and affirm an explicit sense of site and place. Social, cultural, physical, and historic factors and their relationships to site planning and planning are critically explored through theory and practice in this studio.

LA 315 Site Engineering I
Spring. 3 credits. Prerequisite: permission of instructor.

Lectures and studio projects focusing on the professional skills and knowledge required to competently and creatively develop grading plans for project-scale site design.

LA 316 Site Engineering II
Fall. 2 credits. Prerequisite: LA 315 or permission of instructor.

Lectures and studio projects dealing with earthwork estimating; storm water management, site surveys, site layout, and horizontal and vertical road alignment.

LA 318 Site Construction
Spring. 5 credits. Prerequisite: permission of instructor.

The emphasis of this course is detail design and use of landscape materials in project implementation. Exploration of construction materials, including specifications, cost estimates, and methods used by landscape architects in project implementation are the foci for this course. The course includes lectures, studio problems, and development of drawings leading to construction documentation for a comprehensive project.

Students develop a process of self criticism related to measured drawings specific to the comprehensive project. Course participants fabricate material prototypes in wood and metal.

LA 402 Integrating Theory and Practice: Community Design Studio
Spring. 5 credits. Prerequisite: LA 301 with a grade of C or better. Cost of supplies and fees, about $250; expenses for field trip, about $250.

This course engages the theory and practice of participatory community design through a real community service project. Participants gain an understanding of how to integrate meaningful public service with design invention and creativity. Engage in rigorous design research methods, and understand how institutional and community contexts influence design problem-solving. Students will be expected to work independently and collaboratively on team projects in a community. One class period per week will be designated for community fieldwork. Studio theme to be announced.

LA 403 Directed Study: The Concentration
Fall, spring. 1 credit. Offered to landscape architecture undergraduate students in their final year of study.

Working with their adviser, students create a written and visual paper that documents the concentration intent.

LA 410 Computer Applications in Landscape Architecture
Fall or spring. 3 credits. Offered to landscape architecture students only. Limited to 15 students.

This course is designed to develop a working knowledge of various computer software applications with emphasis on AutoCad. The course explores other applications relative to land-use planning and the profession of landscape architecture.

LA 412 Professional Practice
Spring. 1 credit.
Discussed include practice diversity, marketing or in other professional situations. Topics opportunities one may encounter in an office, A topical seminar with a different subject and method each time it is offered. Subject and schedule include "Landscape and Visual Culture," fall 2005—an inquiry into the visual construction of landscape and landscape representation in visual (painting, photography, film, graphic design) and written texts; "Understanding Ordinary Landscapes," fall 2006—a study of common places, including their spatial and visual patterns, uses, and material culture. "Landscape and Critical Thinking," fall 2007 dealing with landscape as a tool for studying social and artistic issues, landscape as a basis for social order, and landscape as a critique.

LA 486 Placemaking by Design
Fall. 3 credits. Preference given to juniors, seniors, and graduate students. Limited to 20 students. S-U grades optional.

This seminar provides an understanding of contemporary planning and landscape architecture design strategies that reaffirm and reclaim a sense of place. Readings and discussions focus on the theory and practice of placemaking as represented in the literature and in built works. The seminar 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 491 Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment (also HORT 491)
Fall. 4 credits. Limited to majors in horticulture or landscape architecture or by permission of the instructors. Limited to 48 students. Prerequisites required. Cost of supplies, about $50; expenses for field trips, about $90.

This course 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 follows by written specifications and graphic details is produced to implement these practices.

LA 492 Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment (also HORT 492)
Spring. 4 credits. Prerequisites: a passing grade in HORT/LA 491. Limited to majors in horticulture and landscape architecture or by permission of the instructors. Limited to 48 students. Prerequisites required. Cost of supplies about $50; expenses for field trips $50.

The second half of this course continues to focus 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 detail, and planting techniques. Students critically assess potential planting sites; and 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 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 with HORT/LA 491 and 492 constitute an integrated course.

LA 494 Special Topics in Landscape Architecture
Fall or spring. 1–3 credits; may be repeated for credit. S-U grades optional.

Topical subjects in landscape architectural design, theory, use and history. Group study of topics not considered in other courses.

LA 495 Green Cities: The Future of Urban Ecology (also CRP 495)
Fall. 4 credits. Explores the history and future of the ecology of cities and their role in solving the present global ecological crises. The politics, design, and economics of "green cities" are examined in terms of transportation, renewable energy, solid waste and recycling, land use, and the built environment.

LA 497 Individual Study in Landscape Architecture
Fall or spring. 1–5 credits; may be repeated for credit. Students must register using an Independent Study form (available in 140 Roberts Hall). S-U grades optional.

Work on special topics by individuals or small groups.

LA 498 Undergraduate Teaching
Fall or spring. 1–2 credits. Prerequisites: previous enrollment in course to be taught and permission of instructor. Students must register using an 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 499 Undergraduate Research
Fall or spring. 1–5 credits. Students must register using an 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 501 Composition and Theory
Fall. 5 credits. Limited to graduate students. Cost of drafting supplies and fees, about $250. The field trip will cost about $250.

Basic principles of natural and cultural processes that form "places" in the landscape. Projects focus on design applied to the practice of landscape architecture: particularly the relationship between measurement, process, experience, and form at multiple scales of intervention.
The studio focuses on site-scaled projects that consider significant cultural and environmental and cultural history of the States. Topics include the recent history of historic landscapes, and important practitioners and notable projects. Format for the class is assigned readings and discussion, invited speakers, lectures, and a project documenting a local site.

LA 582 The American Landscape
Fall. 3 credits.
An interdisciplinary study of the environmental and cultural history of the American landscape. Topics include the relation of landscape to culture, landscape use and ecological change, regional and national landscapes, and perceptions of landscape expressed in paintings, photographs, and literature. Graduate students complete additional outside work and attend an additional class session.

LA 590 Theory Seminar
Spring. 3 credits. For seniors and graduate students.
Seminar in landscape design theory.

LA 598 Graduate Teaching
Fall or spring. 1–3 credits. Prerequisite: permission of instructor. Students must register using an Independent Study form. Staff.
Designed to give qualified students experience through involvement in planning and teaching courses under the supervision of faculty members. The experience may include leading discussion sections, preparing, assisting in desk critiques, and presenting lectures. There are assigned readings and discussion sessions on education theory and practice throughout the term. (Credit hours are determined by the formula: 2 hours per week = 1 credit hour).

LA 601 Integrating Theory and Practice I
Fall. 5 credits. Limited to graduate students or by permission of instructor. Cost of supplies and fees, about $250.
The studio focuses on site-scaled projects that consider significant cultural and natural landscapes. Theories of landscape restoration, sustainable design, and landscape representation are explored through projects that derive form from site and place. The integration of site history, ecology, and site construction supports an understanding and relationship between design and site.

LA 602 Integrating Theory and Practice II
Spring. 5 credits. Limited to graduate students. Cost of drafting supplies and fees, about $250; expenses for the field trip, about $250.
The studio builds upon 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. The course focuses on the expression of design solutions that grow from and affirm an explicit understanding of place, social, cultural, physical, and historic factors and their relationship to site design and planning are critically explored through theory and practice.

LA 603 Directed Study: The Concentration
Fall, spring. 1 credit. Open to landscape architecture graduate students in their final year of study. Working with their adviser, students create a written and visual paper that documents the concentration intent.

LA 615 Site Engineering I
Spring. 3 credits. Prerequisite: permission of instructor. Lectures and studio projects focusing on the professional skills and knowledge required to competently and creatively develop grading plans for project-scale site design.

LA 616 Site Engineering II
Fall. 2 credits. Prerequisite: LA 615 or permission of instructor. Lectures and studio projects dealing with earthwork estimating, storm water management, site surveys, site layout, and horizontal and vertical road alignment.

LA 618 Site Construction
Spring. 5 credits. Prerequisite: permission of instructor. The emphasis of this course is detail design and use of landscape materials in project implementation. Exploration of materials, including specifications, cost estimates, and methods used by landscape architects in project implementation are the foci for this course. The course includes lectures, short studio problems, and the development of drawings leading to construction documentation for a comprehensive project. Students develop a process of self-criticism related to measured drawings specific to the comprehensive project. Course participants fabricate material prototypes in wood and metal.

LA 619 Advanced Site Graduating
Fall. 2 credits. Limited to 10 students. Prerequisite: LA 619 or LA 615. Grading skills and knowledge applied as a design component of site planning projects.

LA 666 Pre-Industrial Cities and Towns of North America (also CRP 666)
Fall. 3 credits. Offered alternate years. Various American Indian civilizations as well as diverse European cultures have all exerted their influences on the organization of town and city living. This course considers how each culture has altered the landscape in its unique way as it created its own built environments.

LA 680 Graduate Seminar in Landscape Architecture
Fall or spring. 1–3 credits. May be repeated for credit. Limited to graduate students. S-U grades optional.
Topical subjects in landscape architectural design, theory, history, or technology. Includes seminar topics and group study not considered in other courses.

LA 694 Special Topics in Landscape Architecture
Fall or spring. 1–3 credits. May be repeated for credit. S-U grades optional.
Topical subjects in landscape architectural design, theory, history, or technology. Includes group study of topics not considered in other courses.

LA 701 Urban Design and Planning: Designing Cities in the Electronic Age (also CRP 555)
Fall. 5 credits. Limited to graduate students. Cost of supplies and fees, about $250; expenses for the required field trip, about $250.
Application of urban design and town-planning techniques to specific contemporary problems of city environments. Issues of urbanism are investigated and applied to physical design interventions and spatial typologies involving the street, square, block, garden, and park systems. Three-dimensional computer modeling and digital design media are introduced as tools for urban design. This is a specially arranged collaborative studio with the Department of City and Regional Planning.

LA 702 Advanced Design Studio
Spring. 5 credits.
A capstone studio that provides the opportunity to explore issues in contemporary landscape architecture and to integrate related skills. Topics include the influences of culture, history, and criticism, as well as reinterpretations of engineering and representation.

LA 800 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
B. L. Bedford, B. Blasyee, T. Brown.
L. E. Buck. F. Couch, P. Curtis, D. J. Decke.
R. Jackson, C. Kraft, L. E. Krasny.
J. P. Lassoie, B. Lauber, R. A. Malecki, E. Mills.
S. Morreale, M. Musksrud, M. E. Richmond.
L. Rudstrom, R. Schneider, R. Sherman.
T. Tantillo, S. Wolf, J. B. Xavir.
Note: class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

NTRES 100 Introduction to Environmental Studies
Summer. 3 credits. S-U grades optional.
R. J. McNeil.
This discussion-centered course examines 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 101 Introduction to the Field of Natural Resources
Fall. 3 credits. Limited to first-year students in the Natural Resources Department.
The course provides a comprehensive overview of the modern natural resource and environment to new students. The course focuses on identifying the components of knowledge required to understand the Earth's natural resources and ecological systems, and to participate intelligently in their conservation and management. Local case studies are used to introduce students to the scientific, ethical, and societal basis for protection and management of natural resources and environments. Students become actively engaged in data collection and analysis, use quantitative models to analyze and interpret data, explore the human dimensions of natural resource issues, and come to understand the complexities of the policy process and management strategies.
NTRES 201 Environmental Conservation
Spring. 3 credits. T. Fahey.
At the beginning of the twenty-first century, our lives are increasingly 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 portrayals of the environmental dilemmas offered by the mass media to gain a firmer basis for responsible citizenship and action on environmental issues.

NTRES 210 Introductory Field Biology
Fall. 4 credits. Limited to 90 students. Open to sophomores and juniors with an advisor in natural resources or by permission of instructor. Prerequisites: BIO G 101 and 102 or equivalent. Two overnight weekend field trips required. Cost of field trips, approximately $12. T. Gavvin and C. Smith.
Introduction to methods of inventorying, identifying 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. Selected aspects of current ecological thinking are stressed. The interaction of students with biological events in the field and accurate recording of those events are emphasized.

NTRES 220 People, Values, and Natural Resources
Spring. 3 credits. J. Tantillo.
Cultural and political context for natural resource conservation and management in North America. Historical basis is explored through analysis of North American environmental history, examining shifts in attitudes and conceptions of human relationships to natural resources and the environment. Key laws guiding policy, conservation, and management of natural resources are reviewed. Concepts underlying the study of human attitudes, behaviors, institutions, and decision-making processes related to natural resource conservation and management are introduced.

NTRES 306 Coastal and Oceanic Law and Policy
Summer. 2 credits. A special 1-week course offered at Cornell's Shallows Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Staff.
Intended for students interested in careers in management of marine or coastal resources or in the natural sciences. Subjects include law and policy related to ocean dumping, marine sanctuaries, environmental impact statements, water and air pollution, fisheries management, offshore drilling, production, and territorial jurisdiction. Lectures on the status and history of law are accompanied by discussion of relevant policy and efficacy of various legal techniques. A case study that requires extensive use of the laboratory's library and personnel is assigned. The week concludes with a mock hearing.

NTRES 310 Applied Population Ecology
Fall. 3 credits. Letter grade only. Prerequisite: background in biology or ecology strongly recommended; completion of Calc II or equivalent. E. Cooch.
An in-depth analysis of the ecological factors influencing the natural fluctuation and regulation of animal population numbers. The course examines models of single- and multi-species population dynamics, with emphasis on understanding the relationship between ecological processes operating at the individual level and the subsequent dynamics at the population level. Significant emphasis is placed on principles as applied to conservation and management.

NTRES 311 Fish Ecology, Conservation, and Management
Spring. 3 credits. Prerequisites: NTRES 210 or permission of instructor; NTRES 310 or a general ecology course recommended. E. Mills and L. Rudstam.
Basic principles of fish ecology at the individual, population, and community level are covered, particularly as they relate to interactions between fish and the aquatic environment. Emphasis is placed on the application of these principles to the conservation and management of fisheries resources and aquatic ecosystems. Illustrative examples are provided from current literature and case studies.

NTRES 312 Fish Ecology Laboratory
Spring. 1 credit. Prerequisite: NTRES 311 or concurrent enrollment. Two weekend field trips. E. Mills and L. Rudstam.
Two overnight weekend field trips to the Cornell Biological Field Station and the Adirondack Field Station. Activities include experiences with various fish sampling gear and analysis of collected samples. Discussions about sampling considerations and inferences we can make by contrasting the ecology of fish in lakes of different productivity. Includes visit to a state of the art fish hatchery and evening discussion session during the field trips. Written reports required.

NTRES 313 Biological Statistics I (also BTRY 301)
Fall. 4 credits. Prerequisite: one semester of calculus. P. J. Sullivan.
Statistical methods are developed and applied 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 314 Conservation of Birds
Spring or summer. 2 credits. Prerequisite: NTRES 210 or permission of instructor. Offered alternate odd years. C. R. Smith.
A course for majors and nonmajors, focusing on science-based bird conservation and management at the organism, population, community, and landscape levels. Current resource management issues relevant to birds are explored in the contexts of agricultural practices, habitat management, tropical deforestation, 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 315 Conservation of Birds Laboratory
Spring or summer. 1 credit. Concurrent enrollment in NTRES 314 required. Saturday mornings, THA. Offered alternate odd 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; and strategies for attracting and observing birds to their habitats and to other birds; and methods and procedures for censusing and surveying songbird populations.

NTRES 321 Introduction to Biogeochemistry (also EAS 321)
Fall. 4 credits. Prerequisites: college-level chemistry; plus a course in biology and/or geology. J. B. Yavitt and L. A. Derry.
For description, see EAS 321.

NTRES 322 Global Ecology and Management
Spring. 3 credits. Prerequisites: college-level biology and general ecology. J. 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 323 Principles of Toxicology (also TOX 323)
Spring. 3 credits. Prerequisites: one year each of chemistry and biology with labs; one semester of organic chemistry lecture or permission of instructor. J. W. Gillett.
This introductory lecture course in human and environmental toxicology emphasizes basic principles (exposure, dose-response, effects) involved with pesticides, hazardous wastes, and natural products. Science-based assessments for risk analysis and policy are integrated with other considerations. Guest speakers and extensive case studies augment lectures and student team exercises applied to management.

NTRES 324 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 limnology, seasonal variability and communities, groundwater-surface connections, flow paths for dispersal, patchily distributed water resources, and water quality controls on organisms.

NTRES 325 Forest Management and Maple Syrup Production
Spring. 3 credits. Prerequisites: one year of college-level biology. Offered alternate even years. P. J. Smallidge.
A practical, field-oriented course emphasizing principles and practices of stewardship and multiple purpose utilization of soils and nonindustrial, private forest land in the northeastern United States, including the production of maple syrup.
NTRES 330 Natural Resources Planning and Management
Fall. 3 credits. Prerequisite: junior standing. B. L. Bedford.
Focus is on terrestrial and aquatic resources. Concepts emphasized include 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 331 Environmental Governance (also S&Ts 314 and B&SOC 314)
Spring. 3 credits. S. Wolf.
This course considers the question of environmental governance, defined as the assembly of social institutions that regulate natural resource use and shape environmental outcomes. Participants will explore the roles of public policy, market exchange, and collective action in resource (mis)management. Theoretical concepts from a variety of social science perspectives will be introduced 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) will highlight scope for institutional innovation. Students who wish to take the course for graduate credit should see NTRES 631.

NTRES 406 Ecology Risk Assessment (also TOX 406)
Fall. 3 credits. Prerequisites: BIOEE 26l or equivalent; permission of instructor if not an advanced student in natural sciences or engineering. J. W. Gillett.
This course strives to develop understanding of and competence in the different types of ecological (nonhuman health) risk assessment based on USEPA principles and methods. Focus is on cases for chemical, physical, and biological stressed species and in a variety of circumstances.

NTRES 410 Conservation Biology: Concepts and Techniques
Fall. 4 credits. Prerequisite: NTRES 210. E. G. Couch and T. A. Gavish.
A thorough analysis of the ecological and quantitative dimensions for decision making in modern conservation biology and management. Emphasis is on analysis of variation and maintenance of biological diversity, and will focus on principles and techniques, including demographic viability analysis of populations, genetic analysis, as well as aspects of the human dimensions of conservation biology.

NTRES 411 Quantitative Ecology and Management of Fisheries Resources
Spring. 4 credits. S-U grades optional. Prerequisites: NTRES 313 or BTRY 301. P. Sullivan.
The dynamics of marine and freshwater fisheries resources are examined with a view toward observation, analysis, and decision making within a quantitative 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 412 Wildlife Population Analysis: Techniques and Models
Spring. 3 credits. Prerequisites: NTRES 310 (or equivalent, or by permission of instructor). M. T. W. R. morning lectures; afternoon labs) in January with follow-up meetings in the spring semester. E. Cooch.
This course will explore the theory and application of a variety of statistical estimation and modeling techniques used in the study of wildlife population dynamics. The course will focus on exploration of a selection of the tools needed for wildlife conservation and management, including (possibly) analysis of mark-recapture data, population viability analysis, decision theory, and matrix modeling.

NTRES 413 Biological Statistics II (also BTRY 302)
Spring. 4 credits. Prerequisite: NTRES 313 or BTRY 301. P. Sullivan.
Linear statistical methods are applied 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 multifactors analysis of variance (ANOVA), and a brief foray into nonlinear modeling. Applied analysis is carried out in the Splus statistical computing environment.

NTRES 420 Forest Ecology
Fall. 3 credits. Prerequisite: introductory biology. T. J. Fahey.
A comprehensive analysis of the distribution, structure, and dynamics of forest ecosystems. Topics include paleoecology of forests; ecophysiology of forest trees; disturbance, succession, and community dynamics; primary productivity, and nutrient cycling.

NTRES 421 Forest Ecology Laboratory
Fall. 1 credit. Cost of weekend trip approximately $30. T. J. Fahey.
Field trip designs 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 Acadia National Park, Vermont, or New Hampshire. Includes group research projects in local forests.

NTRES 422 Wetland Ecology and Management—Lecture
Fall. 3 credits. Prerequisite: BEOEE 261. B. L. Bedford.
Examination of the structure, function, and dynamics of wetland ecosystems with an emphasis on methods needed to understand how human activities affect wetlands. Current regulations, protection programs, and management strategies are considered.

NTRES 423 Wetland Ecology and Management—Laboratory
Fall. 1 credit. Optional. Concurrent enrollment in NTRES 422 is required. B. L. Bedford.
An 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; and methods of sampling wetlands vegetation, soils, and water; and methods of wetland identification and delineation.

NTRES 424 Landscape Impact Analysis
Fall. 3 credits. Prerequisites: one introductory and one advanced course in ecology or the equivalents, and junior standing. B. L. Bedford.
This course presents ecological concepts and analytical tools needed to evaluate environmental impacts to natural resources and ecosystems within an integrated context that incorporates the landscape in which these resources occur. It explores diverse conceptual frameworks for landscape impact analysis and exposes students to modern tools for evaluating landscapes.

NTRES 426 Practicum in Forest Farming as an Agroforestry System (also HORT 426 and CSS 426)
Students will actively take part in the development and management of a seventy-year-old nut grove originally planted at Cornell in the 1930s. The MacDaniel's Nut Grove is being developed as a multipurpose forest-farming teaching, research, and extension site. Hands-on activities will include all or most of the following: temperate-nut harvest and variety evaluation, mushroom culture, small-fruit and fruit-tree culture, medicinal-herb culture, site evaluation and planning, and field trips to other agroforestry-related sites. Outdoor activities will be integrated with selected readings via an online discussion board.

NTRES 427 Ecoregions: Ecology and Conservation
Spring. 2 credits. Letter grade only. Prerequisites: NTRES 210, 310; statistics recommended; junior standing or above. C. R. Smith.
Approaches to characterizing and classifying terrestrial habitats and ecoregions at a variety of spatial scales are reviewed and discussed. A landscape approach is used to introduce habitat management concepts and land cover classifications. Legislation guiding federal land management decisions is discussed, and field trips may go to areas managed by public and private land management organizations.

NTRES 430 Environmental and Natural Resources Policy Processes
Spring. 3 credits. Prerequisites: junior standing; special application process, and course fee (approx. $400). Lec.; two 3-hour orientation sessions in fall semester and four 2-hour sessions in February and March. Completed applications due by October 14. Applications are available by contacting map10@cornell.edu or at www.dnr.cornell.edu/courses/NR402/402info.htm. B. A. Knuth.
An intensive exploration of the environmental policy process and its conceptual framework.
Recognizing and defining natural resource or environmental problems and issues; aggregating interests; agenda-setting; formulating and selecting alternative solutions; implementation and evaluation; roles of lobbyists, legislature, executive branch, and other actors. Case studies: presentations by and discussions with about twenty prominent Washington policymakers who appear as guest lecturers. Required: interviews, term paper, and oral reports. Includes 11 days in January in Washington, D.C.

NTRES 431 Environmental Strategies
Fall. 3 credits. Prerequisite: AEM 250 or permission of instructor. S. Wolf.
How is conservation of natural resources pursued in today's institutional environment? The course focuses on opportunities to mobilize market mechanisms and competitive strategies of firms to harmonize social and ecological demands on environmental systems. Through production of a portfolio of analyses of real-world integrated environmental management schemes, students explore the mechanics of this general class of policy tools and develop a critique as to why the market does not represent a comprehensive approach to sustainability.

NTRES 432 Human Dimensions of Natural Resource Management
Spring. 3 credits. S-U grades optional. Limited to juniors and seniors. J. Enck.
This course focuses on how a social science-based understanding of human attitudes, values, and behaviors can be incorporated in natural resource management decisions and actions. Examples from federal, state, and nongovernmental fish, wildlife, and forest management programs are used to illustrate the importance of socioeconomic considerations in problem solving and decision making.

NTRES 434 International Conservation: Communities and the Management of the World's Natural Resources
Spring. 3 credits. Letter grade only. J. Lassoie.
Lectures, readings, and multimedia information, including the Internet, build 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, China, 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 444 Resource Management and Environmental Law (also CRP 444)
Spring. 3 credits. For juniors, seniors, and graduate students. S-U grades optional. R. Booth.
For description, see CRP 444.

NTRES 456 Stream Ecology (also ENTERM 456, BIOEE 456)
Spring. 4 credits. Limited to 60 students. Prerequisite: BIOEE 201 recommended. Offered alternate even years. Next offered spring 2006. B. Peckarsky.
For description, see ENTERM 456.

NTRES 480 Global Seminar: Building Sustainable Environments and Secure Food Systems for a Modern World (also FD SC 480, IARD 480)
Spring. 4 credits. Prerequisites: junior, senior, or graduate student standing. J. Lassoie and D. Miller.
Modernization has lead to development pressures that have increasingly disrupted natural systems leading to widespread concern about the long-term viability of important environmental services, including those critical to food security worldwide. This multidisciplinary course uses case studies to explore interactions among social, economic, and environmental factors basic to sustainable development. Cases include population growth, genetically modified foods, biodiversity, sustainable tourism, global warming, and global responsibility. Cornell faculty members lead discussions in each of the major topic areas. In addition, students participate in discussions and debates with students from Sweden, Costa Rica, Honduras, South Africa, and Australia through live interactive videoconferences and electronic discussion boards.

NTRES 493 Individual Study in Resource Policy, Management, and Human Dimensions
Fall, spring, or winter. Credit TBA. S-U grades optional. Prerequisite: permission of instructor. R. A. Baer, T. Brown, L. E. Buck, D. J. Decker, J. Enck, J. Gillett, B. Knuth, T. B. Lauber, M. Muskett, J. Tanilillo, and S. Wolf.
Topics in environmental and natural resource policy, management, and human dimensions are arranged depending on the interests of students and availability of staff. Students must register using an Independent Study form (available in 140 Roberts Hall).

NTRES 494 Special Topics in Natural Resources
Fall or spring. 4 credits maximum. S-U grades optional.
The department teaches "trial" courses under this number. Offerings vary by semester, and are advertised by the department before the semester starts. Students who register under this number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

NTRES 495 Individual Study in Fish and Wildlife Biology and Management
Topics in fish and wildlife biology and management are arranged depending on the interests of students and availability of staff. Students must register using an Independent Study form (available in 140 Roberts Hall).

NTRES 496 Individual Study in Ecology and Management of Landscapes
Fall or spring. Credit TBA. S-U grades optional. Prerequisite: permission of instructor. B. Bedford, B. Blossey, T. Faihey, J. Krauny, J. Lassoie, R. Schneider, J. Tantillo, and J. Yuett.
Topics in ecology and management of landscapes are arranged depending on the interests of students and availability of staff. Students must register using an Independent Study form (available in 140 Roberts Hall).

NTRES 498 Teaching in Natural Resources
Fall and spring. 1-4 credits. Prerequisite: permission of instructor. Students must register using an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
Course designed to give students an opportunity to obtain teaching experience by assisting in labs, field trips for designated sections, discussions, and grading. Students gain insight into the organization, preparation, and execution of course plans through application and discussions with instructor.

NTRES 500 Professional Projects—M.P.S.
Fall and spring. Credit TBA. Limited to graduate students working on professional master's projects. S-U grades only.

NTRES 600 Introduction to Graduate Study in Natural Resources
Fall or spring. 2 credits. This course is open to beginning graduate students whose faculty advisers are in Natural Resources. S-U grades. Lec TBA.
Designed for beginning Natural Resources graduate students, this course 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. Students are required to complete a research proposal.

NTRES 601 Seminar on Selected Topics in Natural Resources
Fall or spring. 1 credit. S-U grades only. TBA. Check with department for availability. Staff.
Selected readings and discussions of research and/or current problems in natural resources. Offering varies by semester and is subject to availability of staff.

NTRES 603 Inquiry Science Outreach in Secondary Schools (also EDUC 603)
Fall or spring. 1 credit. Prerequisite: must be a recipient of a fellowship from Cornell Science Inquiry Partnerships (CSIP) program. S-U grades. N. Trautmann, I. Tompkins, and M. Krasy.
This course prepares graduate students who receive Cornell Science Inquiry Partnerships fellowships for outreach work in high school and middle school science classes. Participants explore effective strategies for inquiry-based learning and review core educational issues such as learning standards, working with students of various ability levels, and assessing student learning.

NTRES 604 Seminar on Selected Topics in Resource Policy and Management
Fall. 2 credits. S-U grades only. TBA.
Check with department for availability.
Special topics seminar on subjects related to resource policy and management. Offering varies by semester and is subject to availability of staff.

NTRES 605 Issues in Risk Analysis Seminar (also CEE 605)
Fall. 1 credit. Prerequisite: calculus, advanced course in statistics and basic natural sciences (Chemistry, Biology, Earth Systems). S-U only. Lec. TBA. J. Gillett and R. Davidson.
Discussion of current issues and ongoing research on risk analysis issues from
many perspectives with an emphasis on environmental risk analysis. Speakers address problem formulation, quantitative/qualitative methods in assessment of risks, communication issues, and challenges to risk assessment. Some sessions held jointly with other seminar series. Enrollment in seminar requires short reports and participation in two required discussion meetings for class members designed to integrate the issues raised during the semester.

**NTRES 607 Ecotoxicology (also TOX 607)**
Spring. 3 credits. Prerequisites: graduate or senior status, or permission of instructor. Offered alternate odd years. Next offered spring 2006. J. W. Gillett. Lectures, readings, and special guest focus on the principles of effects of toxic chemicals on natural ecosystems, their components, and processes. Major topics include fate and transport of chemicals (chemodynamics), comparative biochemical toxicology, ecosystem process analysis, simulation through mathematical and physical (microcosm) models, and relationships to regulation and environmental management.

**NTRES 611 Quantitative Ecology and Management of Fisheries Resources**
Spring. 4 credits. S-U grades optional. Prerequisites: NTRES 315 recommended or permission of instructor. Offered even years. Next offered spring 2006. P. J. Sullivan. This course is taught in conjunction with NTRES 411 (see description above). Students taking the course for graduate credit are asked, in addition to the 400-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 612 Wildlife Population Analysis: Techniques and Models**
Spring. 3 credits. Prerequisites: NTRES 310 (or equivalent, or by permission of instructor), a college-level math and statistics class. Lecture/lab: 2-week all-day (Monday through Friday) course in January with follow-up meetings during the spring semester. For description, see NTRES 412.

**NTRES 614 Fish and Wildlife Ecology Seminar**
Fall and spring. 1 credit. Prerequisite: permission of instructor. Check with Department. Staff discussion of individual research, current problems, and current literature in fish and wildlife ecology. Offering varies by semester and subject to availability.

**NTRES 615 Case Studies and Special Topics in Agroforestry**
Spring. 2 credits. Prerequisites: graduate standing or permission of instructor. S-U grades optional. J. P. Lassoie.

**NTRES 616 Forest Science and Management Seminar**
Fall. 1 credit. For graduate students and upper-level undergraduates. J. B. Yavitt. This seminar course includes review of current literature, student research, and selected topics of interest. Topics include biogeography, ecology, and human use of forests located in boreal, temperate, and/or tropical environments.

**NTRES 631 Environmental Governance**
Spring. 4 credits. S. Wolf. For description, see NTRFS 331. Students taking the course for graduate credit will be required to read supplemental materials, undertake more complex research assignments, and participate in seminar discussion section.

**NTRES 670 Spatial Statistics**
Spring. 3 credits. Prerequisites: BTRY 601 and 602; an intro GIS course strongly recommended. S-U grades optional. Offered alternate odd years. P. J. Sullivan. Spatial statistical concepts and techniques are developed and applied 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 620.

**NTRES 694 Special Topics In Natural Resources**
Fall or spring. 4 credits maximum. S-U grades optional. 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 696 Agroecological Perspectives for Sustainable Development (also IARD 696 and CSS 696)**
Fall and spring. 1 credit. S-U grades only. Prerequisites: graduate or senior standing in scientific discipline and permission of instructor. A student-faculty colloquium on subjects of current interest, usually focusing on multidisciplinary aspects of topical problems (e.g., Superfund, oil spills).

**NTRES 698 Current Topics: Environmental Toxicology (also TOX 699)**
Fall, spring. 1-3 credits. Prerequisites: graduate experience in toxicology. Students should consider taking this course simultaneously with CSS 620.

**NTRES 699 Graduate Individual Study in Natural Resources**
Fall or spring. Credit TBA. S-U grades only. Prerequisites: permission of instructor. NTRFS 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 800 Master's Thesis Research**
Fall and spring. Credit TBA. Limited to graduate students working on master's thesis research. S-U grades only.

**NTRES 900 Graduate-Level Thesis Research**
Fall and spring. Credit TBA. Limited to graduate students in a Ph.D. program only before the "A" exam has been passed. S-U grades only.

**NTRES 901 Doctoral-Level Thesis Research**
Fall and spring. Credit TBA. For students admitted to candidacy after the "A" exam has been passed. S-U grades only.

**NTRES 411 Animal Production**
Fall and spring. 2 credits. Prerequisites: one year of introductory biology or permission of instructor. Lecs, M W 11:15-12:05; lab, R or F 1:25-4:25. M. A. Mutschler. This course surveys the fundamentals of plant genetics. It 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.

**PL BR 299 Introduction to Research Methods in Plant Breeding and Genetics**

Fall, spring, or summer. 1–3 variable credits. Lec., TBA. S-U grades. Staff. This course is intended for students who are new to undergraduate research. Students enrolled in PL BR 299 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.

**PL BR 401 Plant Cell and Tissue Culture**

Fall. 3 credits. Prerequisites: a course in plant biology or genetics, or permission of instructor. Lecs., T R 10:10. E. D. Earle. This course provides broad coverage of techniques of plant tissue culture, cell, protoplast, embryo, and anther culture and the applications of those techniques to biological and agricultural studies. Examples used include horticultural, agronomic, and endangered species. Genetic modification of plants via gene transfer and other manipulations of cultured cells is a major topic.

**PL BR 402 Plant Tissue Culture Laboratory**

Fall. 1 credit. Enrollment limited. Prerequisites: PL BR 401 (may be taken concurrently) or permission of instructor. W or R 1:25–4:25 (alternating weeks) plus 1 hour TBA. E. D. Earle. This course provides hands-on experience in plant tissue culture and complements PL BR 401. 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.

**PL BR 403 Genetic Improvement of Crop Plants**

Fall. 3 credits. Prerequisites: genetics (BIOGD 281, PL BR 225, or other standard genetics course), and a course in crops or horticulture. M W F 9:05–9:55. 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.

**PL BR 404 Crop Evolution, Domestication and Diversity (also BIOPL 404, IARD 404)**

Fall. 2 credits. S-U or letter grade. Prerequisites: PL BR 225 or permission of the instructor. Lecs., T R 9:05. 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. Underlying ethical, legal, and social issues affecting conservation and use are addressed.

**PL BR 446 Plant Cyto genetics Laboratory**

Spring. 1 credit. S-U only. Prerequisites: a course in genetics or permission of instructor. Will be offered as a 2-week module at a time to be arranged. Check with department for further information. K. N. Watanabe. This course aims to provide fundamental knowledge and techniques in plant cyto genetics. Emphasis is on applications to research on plant genetics and plant breeding. Plant materials include a wide range of crop species. Basic techniques for examination of plant chromosomes are covered.

**PL BR 494 Special Topics in Plant Breeding**

Fall or spring. 4 credits maximum. S-U grades optional. 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.

**PL BR 496 Internship in Plant Breeding**

Fall or spring. Credits variable, may be repeated to a maximum of 6. Minimum of 60 on-the-job hours per credit granted. Faculty supervisor and student may consult to arrange the enrollment period. Prerequisites: permission of instructor and enrollment during the pre-enrollment period of the semester before the internship. Students must be a plant breeding junior or senior with a minimum 3.0 average in plant breeding courses. Students must attach to their course enrollment materials a CAES Independent Study form (available in Roberts Hall). Staff.

**PL BR 497 Individual Study in Plant Breeding**

Fall or spring. Credits variable. Prerequisites: 2 credits, S-U or letter grade. Students enrolled in PL BR 497 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.

**PL BR 498 Undergraduate Teaching**

Fall or spring. Credits variable. S-U grades. Prerequisites: permission of instructor, and previous enrollment in course to be taught or equivalent. Students must register using an Independent Study form (available in 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.

**PL BR 499 Undergraduate Research**

Fall or spring. Credits variable. S-U grades. Prerequisites: permission of instructor. Students must register using an Independent Study form (available in Roberts Hall). Staff. Undergraduate research projects in plant breeding.

**PL BR 504 Research Experience for Teachers (also EDUC 504 and BIO G 504)**

Spring. 3 credits. S-U or letter grade. Prerequisites: appropriate science major, 6 credits education or psychology course work, and permission of instructor. T. Fulton. This course is intended for, but not restricted to, students in the M.A.T. degree program, practicing teachers, and students considering becoming teachers. Students will work in a laboratory with a research team for the semester. Research experiences will be accompanied by weekly discussions and readings. Students will explore how research is conducted, how formal scientific discourse and informal communication occur and differ, and how these concepts can be conveyed during classroom teaching.

**PL BR 604 Methods of Plant Breeding Laboratory**

Fall or spring. Credits variable, may be repeated to a maximum of 6. Minimum of 60 on-the-job hours per credit granted. Faculty supervisor and student may consult to arrange the enrollment period. Prerequisites: permission of instructor, and enrollment during the pre-enrollment period of the semester before the internship. Students must be a plant breeding junior or senior with a minimum 3.0 average in plant breeding courses. Students must attach to their course enrollment materials a CAES Independent Study form (available in Roberts Hall). Staff.

**PL BR 606 Advanced Plant Genetics**

Spring. 3 credits. S-U grades optional. Prerequisites: BIOLG 281 or equivalent and instructor's permission. Lecs., T R 1:25–4:20. M. Jahn. Provides an advanced survey of genetics in higher plants including selected topics in Mendelian genetics, plant reproductive biology, chromosomal biology, cyto genetics, and epigenetics. The development of critical analytical skills is stressed through case studies, in-class exercises, and the course project.

**PL BR 607 Analysis of Sequence Similarity**

Spring. 1 credit. Enrollment limited. S-U grades only. Prerequisites: basic biology, basic genetics, familiarity with computers. Permission of instructor required. M W F 11:15–12:05 for 4 weeks. Dates TBA. Check with plant breeding office after June for details.
This course focuses on the tools available for accessing nucleotide and protein sequence similarity in plants, animals, and microbes and the strengths and limitations of these approaches for answering biological questions. The mathematical and statistical background of the algorithms is presented in lectures, and weekly on-line projects provide students with experience in addressing a range of biological problems involving sequence analysis.

**PL BR 612 Patents, Plants, and Profits: Intellectual Property Management for Scientists and Entrepreneurs** (also IARD 612)
The course covers statutory protection (copyright, trademarks, patents, plant variety protection), contracts (from material transfer to licensing), management of IP (e.g., freedom-to-operate, genetic resources, trade, and marketing), and negotiation. Emphasis is on technology transfer and international aspects. The course is particularly relevant to students interested in science management, technology transfer, international agriculture, and business.

**PL BR 618 Breeding for Pest Resistance** (also HORT 618)
Fall. 2 credits. Prerequisites: BIOGD 281 and PL BR 403 or equivalents. An introductory course in plant pathology and/or entomology also highly recommended. Lec.s, M 2:30-4:25. Offered alternate even years. P. Griffiths.
A multidisciplinary examination of the challenge of incorporating disease and insect resistance into crop plants. Topics covered include natural and international germplasm collections, germplasm evaluation and enhancement, resistance mechanisms in plants, monogenic and polygenic control of resistance, approaches to breeding for resistance, stability of genetic resistance mechanisms, and the use of biochemical, physiological, and molecular tools in breeding for pest resistance.

**PL BR 622 Seminar**
Fall or spring. 1 credit. S-U grades only. T 12:20-1:10. Staff and graduate students.

**PL BR 650 Special Problems in Research and Teaching**
Fall or spring. 1 or more credits. Prerequisite: permission of instructor supervising the research or teaching. Staff.

**PL BR 652 Plant Biotechnology** (also PL PA 662.2 and BIOPH 652.6)
Spring. 1 credit. S-U grades optional. Prerequisite: BIOPH 653.1 or permission of instructor. Lec.s, M W F 10:10-12:15 (12 lecs). E. D. Earle and M. Zaitlin.
This course 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.

**PL BR 653.1 Concepts and Techniques in Plant Molecular Biology** (also BIOPH 653.1, PL PA 663.01)
This introductory module provides a broad overview of molecular biology concepts relevant to the plant sciences. This section serves as a prerequisite to other modules in the BIOPH 653 (fall) and BIOPH 652 (spring) series. The course is divided into three sections: 1) gene discovery: covers genetic, molecular, and genomics 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 metabolomic techniques. This course consists of two lectures and one day of discussion/week. Course material is coordinated with BIOPH 641 (lab). Emphasis is on understanding concepts, techniques, and strategies that are appropriate for different experiments and objectives.

**PL BR 653.2 Plant Genome Organization** (also BIOPH 653.2)
Fall. 1 credit. S-U grade or letter option. Prerequisites: BIOPH 653.1. M W F 10:10-11:00 (12 lecs). Offered alternate years. S. D. Tanksley.
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.

**PL BR 653.6 Molecular Breeding** (also BIOPH 653.6)
Fall. 1 credit. S-U grade or letter option. Lecs, M W F 10:10-11:00 (12 lecs). Offered alternate years. S. 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.

**PL BR 694 Special Topics in Plant Breeding**
Fall or spring. 4 credits maximum. S-U grades optional. 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.

**PL BR 716 Perspectives in Plant Breeding Strategies**
M. E. Sorrells.
Emphasis is on critical discussion and evaluation of selected benchmark papers and current literature. Conventional and molecular selection techniques and breeding objectives, methods, and strategies for both self- and cross-pollinated crops are reviewed and discussed. Extensive outside reading is required. Grades are based on 4 papers demonstrating creative thinking and analysis of plant breeding concepts.

**PL BR 717 Quantitative Genetics in Plant Breeding**
Discussion of quantitative genetics and quantitative trait loci (QTLs) for more efficient plant breeding. Specific topics include: population genetics, linkage, components of variance (estimated from various mating designs), theory and computer analysis for QTL, population structure, multiple locus regressions, and interval analysis. Heritability, theoretical gain from selection; and genotypic and phenotypic correlation coefficients. Due to these differences, the genetic and environmental components of variance are measured. These differences are evaluated to provide data for computing quantitative genetic parameters.

**PL BR 726 Problems and Perspectives in Computational Molecular Biology** (also COM S 726 and BTRY 726)
Fall and spring. 1 credit. S-U only. Prerequisite: permission of instructor. Lec. M 1:25-2:15.
This is a weekly seminar series discussing timely topics of computational molecular biology. The course addresses methodological approaches to sequence annotation, protein structure and function relationships, and evolutionary relationships. Statistical and deterministic computational approaches are covered and specific and detailed biological examples are discussed. Topics of interest are discussed in relation to papers prepared by teams of students and/or faculty members. We pair students/faculty members from biology backgrounds with students from math, computer science, and statistics for paper preparation. Students summarize the salient questions addressed by the paper, the research methods used, and the results obtained. At the end of the presentation, questions are listed on an overhead slide to initiate discussion in the group.

**PL BR 800 Master's-Level Thesis Research**
Fall or spring. Credits variable. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty.
For students working on a master's thesis.

**PL BR 900 Graduate-Level Dissertation**
Fall or spring. Credits variable. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty.
For students in a Ph.D. program only before the "A" exam has been passed.

**PL BR 901 Doctoral-Level Dissertation Research**
Fall or spring. Credits variable. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty.
For students admitted to candidacy after the "A" exam has been passed.
PL AN PATHOLOGY

G. W. Hudler, chair; S. V. Beer,
G. C. Bergstrom, S. Cartinour, A. R. Collmer,
W. E. Fry, S. M. Gray, K. T. Hodge,
S. G. Laziak, K. Lee, J. W. Lorbeer,
R. Loria, G. B. Martin, M. T. McGrath,
M. G. Milgroom, E. B. Nelson, R. J. Nelson,
K. L. Perry, B. G. Tucegon, M. Zaitlin,
T. A. Zitter

Note: class meeting times are accurate at
the time of publication. If changes are
necessary, the department will provide
new information as soon as possible.

PL PA 201 Magical Mushrooms,
Mycorrhizal Fungi, and the
Mycorrhizal Mycology
Spring. 2 credits. S-U optional. Lecs. T R
11:15. G. W. Hudler.
A presentation of the fungi and their roles
in nature and in shaping past and present
civilizations. 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 are emphasized.

PL PA 301 Plant Diseases and Disease
Management
Fall. 3 credits. Prerequisite: one year of
biology. Lecs. M W F 11:15; lab. T or W
1:25. Lectures co-meet with PL PA 401;
laboratories and exams are separate. Credit
can only be earned for one of these courses.
M. G. Milgroom.
An introduction to plant diseases, their
diagnosis, and their management. Topics
covered include: fungi, bacteria, viruses,
viruses and bacteria, other plant pathogens,
disease cycles, plant disease epidemiology,
disease forecasting, and the principles and
practices of plant disease management. This
course is intended for students who want a
practical knowledge of plant diseases and
their control.

PL PA 309 Introductory Mycology
Fall. 3 credits. Prerequisite: one year of
biology. Concurrent registration in PL PA
319 is recommended. Lecs. T R 9:05-9:55;
A survey of the astounding kingdom of fungi,
including mushrooms, moulds, yeasts, athlete’s
foot, fairy rings, and the blue stuff in blue
cheese. The course covers fungal biodiversity
and systematics, fungi as food, and fungi in
their roles in the environment and human affairs.
Students work with preserved and living fungi
and learn basic identification skills. Grades
are based on two prelims, a final exam, and a
culture collection project.

PL PA 319 Field Mycology
Fall, weeks 1-8. 1 credit. Letter grades
only. Lab. W 12:55-2:55 and W 7:30-9:25
F.M. K. T. Hodge.
Learn to identify mushrooms and other
macrofungi on a series of eight afternoon
field trips followed by evening lab sessions. Fungi
are collected during afternoon trips to sites
around Ithaca. In the evenings, students use
technical keys and microscopes to identify
the fungi and learn about their ecology. The
course runs only the first eight Wednesdays of
fall semester. Grades are based on a collection
project and a final laboratory examination.

PL PA 394 Circadian Rhythms (also
ENTOM 394, BIOGD 394, and BION
384)
Fall. 2 credits. Prerequisite: 200-level
biology course. S-U grades optional. Lec. T
10:10-11:50. K. Lee (fall, even years) and
J. Eweer (fall, odd years)
This course explores a fundamental feature
of living organisms from all kingdoms: how
the cellular 24-hour biological clock operates
and influences biological activities. The course
covers fundamental properties of biological
rhythms and circadian rhythms, including the
structure of circadian oscillators in many organisms
including cyanobacteria, fungi, insects, plants,
reptiles, birds, and mammals (including humans).

PL PA 401 Basic Plant Pathology
Fall. 4 credits. Prerequisite: one year of
biology and BIO PL 241 or equivalent.
Recommends: general microbiology, plant
R 1:25. Lectures co-meet with PL PA 241;
laboratories and exams are separate. Credit
can only be earned for one of these courses.
M. G. Milgroom.
An introduction to plant diseases, their
diagnosis, and their management. Topics
covered include: fungi, bacteria, viruses,
viruses and other plant pathogens;
disease cycles, plant disease epidemiology,
disease forecasting, and the principles and
practices of plant disease management.
This course shares lectures with PL PA 241;
laboratories and exams are separate. The
laboratory is similar to that of PL PA 241,
but more basic principles in plant pathology
are emphasized. This course is intended for
students who want preparation for graduate-
level studies in plant pathology.

PL PA 411 Plant Disease Diagnosis
Fall. 3 credits. Limited to 18 students.
Prerequisites: PL PA 241 or equivalent and
permission of instructor. Lec. T R 10:10;
G. W. Hudler.
A method of diagnosing plant diseases
caused by infectious and noninfectious agents
is taught with emphasis on application of
contemporary laboratory techniques and
effective use of the literature. After seven
weeks of formal lecture and laboratory
sessions, students spend the rest of the
semester working on their own to determine
the causes of plant diseases on samples
that have either been received by the Plant
Disease Diagnostic Lab or that have been
prepared by instructors.

PL PA 419 Agricultural Application of
Plant Disease Concepts
Fall. 2 credits. Prerequisite: PL PA 401
or permission of instructor. S-U or letter
option. Lec. M 8:30-10:30; lab. M 10:30-
4:30.
Addressing real-world problems in plant
pathology through the application of
research. Students will tour production fields
of a diversity of major fruit and vegetable
plants that have been impacted by diseases.
Methods for managing diseases based on
research findings as well as the interface
between Research and Extension will be
emphasized. Seven sessions.

PL PA 443 Pathology and Entomology of
Trees and Shrubs (also ENTOM 443)
Fall. 4 credits. Limited to 30 students.
Prerequisites: PL PA 319 or equivalent.
ENTOM 212 or equivalent. Lec. M W F
11:15; lab. F 12:55-2:45. Offered alternate
years. Next offered fall 2004. G. W. Hudler,
P. A. Weston.
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. Emphasis is
on pests of northeastern flora but examples
from other parts of the country and the world
are also used. Forest, shade, and ornamental
plants are considered.

PL PA 470 Professional Skills in Plant
Science
Spring. 2 credits. S-U grades only. Lec.
R 12:5-4:25. Graduate faculty.
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 literature; 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) will also benefit from concepts
presented in this course.

PL PA 494 Special Topics in Plant
Pathology
Fall or spring. 4 credits maximum. S-U
grades optional.
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.

PL PA 497 Independent Study
Fall or spring. 1-5 credits. Students must
register using an Independent Study form
available in 140 Roberts Hall. S-U grades
optional.
An opportunity for independent study of a
special topic in mycology or plant pathology
under the direction of a faculty member.

PL PA 498 Teaching Experience
Fall or spring. 1-5 credits. Students must
register using an Independent Study form
available in 140 Roberts Hall. S-U grades
optional.
Undergraduate teaching assistance in a
mycology or plant pathology course by
mutual agreement with the instructor.

PL PA 499 Undergraduate Research
Fall or spring. 3-5 credits. Students must
register using an Independent Study form
available in 140 Roberts Hall. S-U grades
optional.
An opportunity for research experience under
the direction of a faculty member.
PL PA 601 Concepts of Plant Pathology
Spring. 3 credits. Prerequisites: PL PA 401 or equivalent. S-U grades optional. Lec. T R 8:40-9:55; lab, T 2:00-4:25. A. R. Collmer and staff.

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 examination of literature and other exercises complementary to lecture topics; emphasis is on critical thinking in science. Students prepare and review mock grant proposals.

PL PA 605 Viral Plant Diseases
Spring. 1 credit. S-U grades optional. Prerequisites: PL PA 401 or permission of instructor. Lec, M W 11:15 (7 weeks, 2nd half of semester). Offered alternate years. S. M. Gray.

Introduces students to plant viruses and the diseases they cause. Addresses nomenclature, taxonomy, epidemiology, ecology and epidemiology, transmission, and disease control. A virtual laboratory is used to introduce students to virus disease diagnosis.

PL PA 606 Molecular Plant Virology (also BIOMI 650)
Spring. 1 credit. S-U grades optional. Prerequisites: BIOMI 409 (Principles of Virology), a course in cell biology, or permission of instructor. Lec. M W 11:15 (7 wks. 1st half of semester). Offered alternate years. S. G. Lazarowitz.

Introduces students to the molecular biology of plant virus replication and interactions with the host to produce disease. Material covered includes virus replication strategies, cell-to-cell and systemic movement, host defense responses and virus counterstrategies, and engineered resistance.

PL PA 607 Bacterial Plant Diseases
Fall. S-U grades optional. Prerequisites: PL PA 401 or permission of instructor. Lec. W 9:05 (7 weeks, 1st half of semester only); lab, W 1:25-4:25 (7 weeks, 1st half of semester only). Offered alternate years. S. V. Beer.

This course emphasizes bacterial disease of plants, their occurrence in the field, isolation of bacterial pathogens, and their identification by traditional and contemporary techniques. Bacterial culture and plant inoculation, epidemiology, and control.

PL PA 608 Genomics of Bacterium-Host Interactions (also BIOMI 651)
Fall. 1 credit. S-U grades optional. Prerequisites: BIOMI 290 or equivalent or permission of instructor. Lec. M W 9:05 (2nd half of semester). Offered alternate years. A. Collmer and S. Winans.

Introduction to genomic approaches, tools, and discoveries involving the study of bacterial interactions with plant and animal hosts. Topics include the TIGRE Campbellbacterium and Resource and Artemis tools, the pathogens Yersinia pestis, V. enterococcalica, Pseudomonas syringae, Rabdiola solanaeae, and Agrobacterium tumefaciens, and the symbiont Sinorhizobium meliloti.

PL PA 609 Fungal Plant Diseases
Spring. 1 credit. S-U grades optional. Prerequisites: PL PA 401, or equivalents, or permission of instructor. Lec. F 12:15-2:15 (7 weeks, 2nd half of semester); lab, F 2:30-4:25 (7 weeks, 2nd half of semester). Offered alternate years.


A team-taught course providing basic information on the biology of fungal pathogens and the diseases they cause. The life cycles and disease cycles of representative fungi and diseases they cause are emphasized along with etiological and epidemiological aspects of the diseases covered.

PL PA 610 Oomycete Biology and Pathology
Spring. 1 credit. S-U grades optional. Prerequisites: PL PA 401 or permission of instructor. Lec. M W 9:05-9:55 (7 weeks, 1st half of semester). Offered alternate years. E. B. Nelson.

This course is intended to provide students with a broad exposure to the oomycete pathogens. The basic attributes of this important group and animal, plant, and invertebrate parasites are detailed in lectures and demonstration sessions. Emphasis is placed on biological characteristics important to the pathogenesis of oomycetes. Topics address evolutionary biology, systematics, genetics, developmental biology, mechanisms of pathogenesis, unique aspects of oomycete metabolism and reproduction, and dormancy. Key ecological aspects of the interaction of oomycetes with plants and other microbes are covered. Practical aspects of oomycete biology, including isolation from environmental samples, epidemiology and disease control are also addressed.

PL PA 620 Ecology of Plant Pathogens

The basic ecological concepts, principles, methods, and literature important to the understanding of the interactions of plant pathogens with their physical, biochemical, and microbial environments are covered. Ecological processes that regulate the pre-infection behavior of plant pathogens are emphasized in both aboveground and belowground habitats. Topics include the nature and behavior of pathogen inoculum, population and community biology, pathogen interactions with plant-associated microbial populations and communities, rhizosphere and phyllosphere dynamics, and more.

PL PA 621 Chemical and Biological Disease Control

A discussion of the principles and methods used for the control of plant diseases. Emphasis is placed on chemical and biological strategies for disease control. Topics include historical aspects of disease management in plant pathology; the discovery, use, and mode of action of major fungicide groups; pathogen resistance to fungicides; microbial strategies for biological control, regulation, and commercialization of microorganisms, transgenic microorganisms; and strategies for integrating biological and chemical control strategies.

PL PA 622 Plant Disease Epidemiology
Fall. 1 credit. S-U grades optional. Prerequisites: PL PA 401 or permission of instructor. Lec. M W 9:05 (7 weeks, 1st half of semester). Offered alternate years. Next offered spring 2006. M. G. Milgroom.

An introduction to basic concepts of population dynamics of plant pathogens and plant diseases in time and space. Emphasis is on the interplay between theory and empirical studies on disease progress, spatial patterns and spread, forecasting and risk assessment for plant pathogens.

PL PA 623 Pathogen Population Genetics
Fall. 1 credit. S-U grades optional. Prerequisites: PL PA 401 or permission of instructor. Lec. M W 9:05 (7 weeks, 2nd half of semester). Offered alternate years. Next offered spring 2006. M. G. Milgroom.

Introduction to basic principles of population genetics and evolution as they relate to plant pathogens. Topics include pathogen genetic diversity, population structure, reproductive systems, and migration. Special emphasis is on the applications of population genetics to answering questions about the biology and epidemiology of plant pathogens. Exposure from fungi, oomycetes, bacteria, and viruses are included.

PL PA 638 Filamentous Fungal Genomics and Development (also BIOMI 638)
Spring. 1 credit. S-U grades optional. Prerequisite: BIOMI 281 or equivalent. Lec. M W F 10:10 (last 4 weeks of the semester). Next offered spring 2005. B. G. Turgeon.

Molecular genetic and genomic approaches to the study of fungal biology. Applications of contemporary methodology to genetic dissection of developmental processes, such as plant pathogenesis (including host and tissue specificity) and reproduction, both sexual and asexual, are described. Experimental evidence supporting various hypotheses to explain fungal pathogenicity is evaluated. Examples are chosen from investigations of model plant pathogenic fungi such as Cochliobolus heterostrophus, Magnaporthe grisea, and Glioidum maydis and from well known genetic models such as Aspergillus nidulans and Neurospora crassa.

PL PA 642-659 Special Topics Series
Unless otherwise indicated, the following description applies to PL PA 642-661. Fall or spring. 1 credit. Prerequisite: permission of instructor. S-U grades only. 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.

PL PA 642 Pathogen Population Biology
Fall. TBA. M. G. Milgroom.

PL PA 644 Current Topics in Oomycete Biology

PL PA 645 Plant Virology
The text contains a list of courses offered, with details such as course codes, titles, credit hours, prerequisites, and instructors. The courses cover a range of topics including plant biology, pathology, biochemistry, and molecular biology. Each course description includes important details like the number of credits, prerequisites, and the instructor's name. The courses are organized alphabetically by title, and each entry includes information about the course's focus, the semester(s) it is offered, and any additional remarks or requirements.
Hatchkiss, Joseph H., Ph.D., Oregon State U. Prof., Food Science
Hradzina, Geza, Ph.D., Eidg. Technische Hochschule at Zurich (Switzerland). Prof., Food Science and Technology (Geneva)
Huller, George W., Ph.D., Colorado State U. Prof., Plant Pathology
Hullar, Theodore L., Ph.D., U. of Minnesota. Prof., Natural Resources
Hunter, James E., Ph.D., U. of New Hampshire. Prof., Plant Pathology (Geneva)
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., Biological and Environmental Engineering
Johnson, Patricia A. Ph.D., Cornell U. Prof., Animal Science
Ketterings, Quinnie, Ph.D., Ohio State. Asst. Prof., Crop and Soil Sciences
Knipple, Douglas C., Ph.D., Cornell U. Assoc. Prof. Entomology (Geneva)
Knutt, Barbara A., Ph.D., Virginia Tech. Polytechnical Inst. and State U. Prof., Natural Resources
Koelker, Wolfram, Ph.D., Phillips-University-Marburg (Germany). Prof., Plant Pathology (Geneva)
Kraft, Clifford E., Ph.D., U. of Wisconsin at Madison. Asst. Prof., Natural Resources
Krall, Daniel W. M.I.A Cornell U. Assoc. Prof., Landscape Architecture
Krasny, Marianne E., Ph.D., U. of Washington. Prof., Natural Resources
Kress, Stephen E., Ph.D., Ohio State U. Prof., Plant Breeding
Kroma, Margaret M., Ph.D., Iowa State U. Asst. Prof., Education
LaDue, Eddy L., Ph.D., Michigan State U. Prof., Applied Economics and Management
Laihong, Cheng, Ph.D., Oregon State U. Asst. Prof., Horticulture
Lakso, Alan Wayne Ph.D., U. of California at Davis. Prof., Horticultural Sciences (Geneva)
Lassoie, James P., Ph.D., U. of Washington. Prof., Natural Resources
Lawless, Harry T., Ph.D., Brown U. Prof., Food Science
Lazarowitz, Sonda G., Ph.D., Rockefeller U. Prof., Plant Pathology
Lazzaro, Brian, Ph.D., Penn State U. Asst. Prof., Entomology
Le, Chang Y., Ph.D., Utah State U. Prof., Food Science and Technology (Geneva)
Lee, Kwangwon, Ph.D., Texas A&M U. Asst. Prof., Plant Pathology
Lehmann, Johannes, Ph.D., U. of Bayreuth, Germany. Asst. Prof., Crop and Soil Sciences
Lei, Xingen, Ph.D., Michigan State U. Assoc. Prof., Animal Science
Lewenstein, Bruce V., Ph.D., U. of Pennsylvania. Assoc. Prof. Communication
Liewberr, James K., Ph.D., U. of California at Berkeley. Prof., Entomology
Liu, Ruichal, Ph.D., Cornell U. Asst. Prof., Food Science
Lorber, James W., Ph.D., U. of California at Berkeley. Prof., Plant Pathology
Lorin, Rosemary Ph.D., Michigan State U. Prof., Plant Pathology
Losey, John E., Ph.D., U. of Maryland. Assoc. Prof. Entomology
Lovette, Irby, Ph.D., U. of Pennsylvania. Asst. Prof. Ornithology
Luo, Dan, Ph.D., Ph.D., Ohio State U. Asst. Prof., Biological and Environmental Engineering
Lyson, Thomas A., Ph.D., Michigan State U. Prof., Development Sociology
Martin, Gregory B., Ph.D., Michigan State U. Prof., Plant Pathology
McBride, Murray B., Ph.D., Michigan State U. Prof., Crop and Soil Sciences
McComas, Katherine A., Ph.D., Cornell U. Asst. Prof., Communication
McCook, Susan, Ph.D., Cornell U. Prof., Plant Breeding
McGrath, Margaret T., Ph.D., Pennsylvania State U. Assoc. Prof., Plant Pathology
McMichael, Philip D., Ph.D., SUNY Binghamston. Prof., Development Sociology
Mely, Margaret G., Ph.D., Cornell U. Asst. Prof., Applied Economics and Management
Merwin, Ian A., Ph.D., Cornell U. Assoc. Prof., Horticulture
Milgroom, Michael G., Ph.D., Cornell U. Prof., Plant Pathology
Miller, Denise M., Ph.D., Cornell U. Prof., Food Science
Miller, William B., Ph.D., Cornell U. Prof., Horticulture
Mills, Edward L., Ph.D., Cornell U. Prof., Natural Resources
Montemagno, Carlo D., Ph.D. U. of Notre Dame. Assoc. Prof., Biological and Environmental Engineering
Moraru, Carmen I., Ph.D., U. of Galati, Romania. Assoc. Prof., Food Science
Muehlen, Jane P., Ph.D., North Carolina State U. Asst. Prof., Entomology
Mute, Patricia M., Ph.D., U. of Wisconsin. Prof., Plant Breeding
Nault, Brian, Ph.D., North Carolina State. Asst. Prof., Entomology, Geneva
Nelson, Eric B., Ph.D., Ohio State U. Assoc. Prof., Plant Pathology
Ng, David T., Ph.D., Columbia U. Asst. Prof., Applied Economics and Management
Nielsen, Rasmus, Ph.D., U. of California at Berkeley. Asst. Prof., Biological Statistics and Computational Biology
Novakovic, Andrew M., Ph.D., Purdue U. Prof., Applied Economics and Management
Nyrop, Jan P. Ph.D., Michigan State U. Prof., Entomology (Geneva)
Obendorf, Ralph L., Ph.D., U. of California at Davis. Prof., Crop and Soil Sciences
Oltenacu, Pascal A., Ph.D., U. of Minnesota. Prof., Animal Science
Ostman, Ronald E., Ph.D., U. of Minnesota. Prof., Communication
Overton, Thomas R., Ph.D., U. of Illinois. Asst. Prof., Animal Science
Padilla-Zakour, Olga, Ph.D., Cornell U. Asst. Prof., Food Science and Technology (Geneva)
Parks, John E., Ph.D., Virginia Polytechnic Inst. Prof., Animal Science
Parlangie, Jean-Yves, Ph.D., Brown U. Prof., Biological and Environmental Engineering
Peck, Daniel C., Ph.D., Cornell U. Asst. Prof., Entomology (Geneva)
Peckarsky, Barbara A., Ph.D., U. of Wisconsin at Madison. Prof., Entomology
Pell, Alice N., Ph.D., U. of Vermont. Prof., Animal Science
Perry, Keith, Ph.D., Cornell U. Assoc. Prof., Plant Pathology
Petrovic, A. Martin, Ph.D., Michigan State U. Prof., Horticulture
Pfeffer, Max, Ph.D., U. of Wisconsin at Madison. Prof., Development Sociology
Pinstrup-Andersen, Per, Ph.D., Oklahoma State U. Prof., Applied Economics and Management
Pollak, E. John, Ph.D., Iowa State U. Prof., Animal Science
Pool, Robert M., Ph.D., Cornell U. Prof., Horticultural Sciences (Geneva)
Qualls, Richard L., Ph.D., Colorado State U. Prof., Animal Science
Quick, Susan M., Ph.D., Cornell U. Assoc. Prof., Animal Science
Rakow, Donald A. Ph.D., Cornell U. Assoc. Prof., Horticulture
Raman, Kundukuri, Ph.D., U. of Reading. Prof., Plant Breeding
Rangarajan, Anusuya, Ph.D., Ohio State U. Assoc. Prof., Horticulture
Ramsey, Christine K., Ph.D. U. of California at Davis. Assoc. Prof., Applied Economics and Management
Rao, M. Anandha, Ph.D., Ohio State U. Prof., Food Science and Technology (Geneva)
Rayor, Linda, Ph.D., U. of Kansas. Asst. Prof., Entomology
Regenstein, Joe M. Ph.D., Brandeis U. Prof., Food Science
Rego, Stevano, Ph.D., Ohio State U. Assoc. Prof., Horticultural Sciences (Geneva)
Reisch, Bruce, Ph.D., U. of Wisconsin at Madison. Prof., Horticultural Sciences (Geneva)
Rensing, William H., Ph.D., Oregon State U. Prof., Entomology (Geneva)
Richmond, Milo E., Ph.D., U. of Missouri. Assoc. Prof., Natural Resources
<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
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<tr>
<td>Rizvi, Syed S., Ph.D.</td>
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<td>Riha, Susan S., Ph.D.</td>
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<td>Rose, Jocelyn, Ph.D.</td>
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<td>Sanderson, John P., Ph.D.</td>
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<td>Sanford, John C., Ph.D.</td>
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<td>Seem, P., Pennsylvania State U.</td>
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<td>Setter, Timothy L., Ph.D.</td>
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<td>Simon, Daniel, Ph.D.</td>
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<td>Smith, Elson J., Ph.D.</td>
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<td>Smith, R. David, Ph.D.</td>
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<td>Steponkus, Peter L., Ph.D.</td>
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<td>Straub, Richard W., Ph.D.</td>
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<td>Strawdeman, Rob, Ph.D.</td>
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<td>Thies, Janice E., Ph.D.</td>
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<td>vanEs, Harold M., Ph.D.</td>
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<td>Walker, Larry P., Ph.D.</td>
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<td>Walther, Joseph B., Ph.D.</td>
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<td>Wang, Bing, Ph.D.</td>
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<td>Watkins, Christopher B.</td>
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<td>Weber, Courtney A., Ph.D.</td>
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<td>Weiler, Thomas C., Ph.D.</td>
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<td>Wheeler, Quentin D., Ph.D.</td>
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<td>White, Gerald B., Ph.D.</td>
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<td>Whitlow, Thomas H., Ph.D.</td>
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<td>Wiedmann, Martin, Ph.D.</td>
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<td>Wien, Hans C., Ph.D.</td>
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<td>Wilcox, Wayne F., Ph.D.</td>
<td></td>
<td>California at Davis</td>
<td>Prof.</td>
</tr>
</tbody>
</table>
ADMINISTRATION
Mostafavi Mohsen, dean
W. Stanley Taft, associate dean
Nasrine Seraji, chair, department of architecture
Buzz Spector, chair, department of art
Kenneth M. Reardon, chair, department of city and regional planning
John McKeown, interim director, administration and finance
TBA, director, admissions and student services
TBA, director, alumni affairs and development
M. Susan Lewis, director, career services
Leon Lawrence, director, multicultural affairs
Margaret N. Webser, director, visual resources facility
Jayne A. LeGro, registrar

FACULTY ADVISERS
Architecture students are assigned faculty advisers and are also invited to share concerns with and seek advice from the most appropriate faculty member or college officer, including the registrar, the department chair, and the dean.

Students in the fine arts department are assigned a faculty adviser for the first year. After the first year, students may select their advisers. Students are required to have an adviser throughout their program in their area of concentration.

Undergraduate students in the Program of Urban and Regional Studies are assigned faculty advisers.

All students in the college are invited to share concerns and seek advice from the volunteer student advisers (EARS) at anytime.

DEGREE PROGRAMS

<table>
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<tr>
<th>Degree Programs</th>
<th>Degree</th>
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<tbody>
<tr>
<td>Architecture</td>
<td>B.Arch.</td>
</tr>
<tr>
<td>Fine Arts</td>
<td>B.F.A.</td>
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<tr>
<td>History of Architecture</td>
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<tr>
<td>and Urbanism</td>
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</tr>
<tr>
<td>Urban and Regional Studies</td>
<td>B.S.</td>
</tr>
</tbody>
</table>

The college offers programs leading to the bachelor's degree—the five-year program in architecture leads to the Bachelor of Architecture; four-year programs in art and architecture lead to the Bachelor of Fine Arts. In addition, four-year programs with a concentration in either urban and regional studies or history of architecture lead to the Bachelor of Science.

Graduate-level programs are offered in art, architectural design and urban design, architectural science, history of architecture, and urbanism, historic preservation planning, city and regional planning, regional science, and landscape architecture.

Students in most of these programs work in physical proximity to one another and thus gain a broader understanding of their own special area of interest through contact with students and faculty from other disciplines.

Early in its development, the college set a limit on the number of students it would enroll and devised a selective method of admission. There are now more than 670 students and a full-time teaching staff of over sixty, supplemented by visiting professors and critics, part-time lecturers, and assistants. Teachers and students mix freely, and much instruction and criticism is on an individual basis.

The college's courses are integral parts of the professional curricula. Fundamental subjects are taught by faculty members whose experience provides them with professional points of view. The concentration of professional courses within the college is balanced by the breadth of view gained from courses and informal learning in the rest of the university.

The college believes that this breadth is an essential element of professional education. This conviction is evident in the form of the curricula, the methods of teaching, and the extracurricular life of teachers and students.

FACILITIES
The college occupies Sibley Hall, Olive Tjaden Hall, Rand Hall, and the Foundry. 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. There are darkrooms in the Department of Art that are available for general use by students in the college and are primarily used as laboratories for the photography courses. A darkroom fee must be paid by each user. 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 177,000 books, is capable of supporting undergraduate, graduate, and research programs. Some 1,200 serials are currently received and maintained.

The Visual Resources Facility, made possible through gifts from Ernest 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 450,000 slides.

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.

Rome Program
The College of Architecture, Art, and Planning's Rome Program was founded in the fall of 1986 to provide instruction in Italy for students seeking excellence in art, architecture, and other disciplines. The program offers an educational experience that draws upon the rich past of Rome, its resources in museums, its art and architecture, and its wide variety of cultural offerings. The school is located in the restored seventeenth-century Palazzo Lazzaroni in the center of the eternal city near such well-known Roman sights as Piazza Navona, the Pantheon, and Rome's famous outdoor market at the Campo dei Fiori.

The program in Rome offers components for students majoring in architecture, fine arts, planning, and liberal arts. Full course loads are available to all students in a curriculum that stresses the convergence of artistic, cultural, and architectural ideas vital to an understanding of the city. Students are responsible for planning course schedules that ensure their particular requirements can be met, since course offerings in Rome are limited. For additional information, see
individual department listings or contact the Rome Program Office, 149 East Sibley Hall.

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 Olve Tiaden Gallery and the John Harratt 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
Term by term, 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 term of not less than C (2.0). The record of each student who fails 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 term, 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 term, 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 dean of the college, 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 to request credit for courses taken while on leave. A student's return to study in the college following a required leave of absence is at the discretion of the college's Academic Records Committee. Requests

for spring term return must be made by November 15 and requests for fall term 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 reregister in the College of Architecture, Art, and Planning and is dismissed from the college and is permanently prohibited from continuing studies in it.

The required withdrawal action does not prevent the student from applying for admission to another division of the university.

The above actions are not necessarily sequential. A student who has received a warning may be placed on a required leave of absence at the end of the next term if the performance during that term is deemed to be grossly deficient.

It is necessary to have a cumulative average of at least 1.7 (C-1.7) for graduation.

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 augmented by lectures and seminars, are the core of the program. Sequences of studies in the history of architecture and cities, culture and society, architectural theory, visual studies, environmental design, 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. I 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 two types of degrees: the Bachelor of Architecture and the Master of Architecture. A program may be granted a six-year, three-year, or two-year term of accreditation, depending on its degree of conformity to established educational standards.

Master's degree programs may consist of a preprofessional undergraduate degree and a professional graduate degree, which, when earned sequentially, comprise an accredited professional education. The preprofessional degree, however, is not, by itself, recognized as an accredited degree.

Rome Program

The program offers the opportunity for students from Cornell and other universities to spend one or two terms 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, art, city 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 inspiration and innovation.

Overlap Program

For qualified students the department offers an option that combines the fifth year of the undergraduate program with the first year of the post-professional Master of Architecture program. In the fall of the fourth undergraduate year, interested student petition the department to substitute ARCH 601-602 or 603-604 for ARCH 501-502. At the same time, they complete graduate school applications and submit them with fee and portfolio to the graduate field assistant for architecture. Students accepted into the program may not normally begin until the fall
of their fifth year and, once enrolled, may not transfer back into the 501–502 sequence.

Following admission into the Overlap Program, students may petition to apply toward the requirements of the master's degree a maximum of 30 credits, including ARCH 601–602 or 603–604 and other advanced courses taken in excess of distribution requirements for the Bachelor of Architecture degree.

Curriculum

First Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Term</td>
<td>101 Design I</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>181 History of Architecture I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>151 Drawing I</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MATH 111 Calculus or out-of-college elective</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>Out-of-college elective</td>
<td>3</td>
</tr>
<tr>
<td>Spring Term</td>
<td>102 Design II</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>182 History of Architecture II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>152 Drawing II</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MATH 106 or MATH 111 or out-of-college elective</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>Out-of-college elective (freshman writing seminar suggested)</td>
<td>3</td>
</tr>
<tr>
<td>Second Year</td>
<td>201 Design III</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>263 Structural Concepts</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>231 Architectural Analysis I</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>262 Building Technology, Materials, and Methods</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Out-of-college elective</td>
<td>3</td>
</tr>
<tr>
<td>Spring Term</td>
<td>202 Design IV</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>232 Architectural Analysis II</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>261 Site Planning</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>264 Structural Elements</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>College elective</td>
<td>3</td>
</tr>
<tr>
<td>Third Year</td>
<td>301 Design V</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>361 Environmental Control I—Lighting and Acoustics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Departmental elective</td>
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</tr>
<tr>
<td></td>
<td>Out-of-college elective</td>
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Required Departmental Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Terms</th>
<th>Subject</th>
<th>Numbers</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>design</td>
<td>mathematics</td>
<td>MATH 111, MATH 106, or approved equivalent</td>
<td>3-4</td>
</tr>
<tr>
<td>3</td>
<td>structures</td>
<td>203, 264, 365</td>
<td>10</td>
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<td>4</td>
<td>technology</td>
<td>261, 262, 361, 362</td>
<td>12</td>
<td></td>
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<tr>
<td>2</td>
<td>architectural theory</td>
<td>231, 232</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>history of architecture</td>
<td>181, 182</td>
<td>6</td>
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Electives

<table>
<thead>
<tr>
<th>Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>architecture, culture, and society</td>
</tr>
<tr>
<td>1</td>
<td>professional practice</td>
</tr>
<tr>
<td>2</td>
<td>drawing</td>
</tr>
<tr>
<td></td>
<td>Total credits</td>
</tr>
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</table>

College Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>art: any studio courses (ART 214 will fulfill)</td>
</tr>
</tbody>
</table>

Out-of-College Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>computer programming or applications</td>
</tr>
<tr>
<td>1</td>
<td>freshman seminar</td>
</tr>
<tr>
<td>1</td>
<td>mathematics, or physical or biological sciences</td>
</tr>
<tr>
<td>1</td>
<td>humanities</td>
</tr>
<tr>
<td></td>
<td>Total credits</td>
</tr>
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</table>

Free

<table>
<thead>
<tr>
<th>Term</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>1</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.</td>
</tr>
</tbody>
</table>

Total credits | 176 |

Architecture Concentrations for Majors

The Department of Architecture recognizes any concentration earned within the university but outside of the department (using standards set by those departments) on the transcripts of its students. It is often advantageous for undergraduates to concentrate in specific subdisciplines of architecture, especially if they anticipate application to specialized graduate programs; therefore, the following concentrations in architecture are offered within the department for B.Arch. and B.F.A. in Architecture candidates only:

Architecture, Culture, and Society 342 (or equivalent), plus 9 credits in this area.

Architectural Science and Technology 261, 262, 263, 264, 361, 362, 363, distribution requirement (3 credits), plus 6 credits in this area.

History of Architecture 181, 182, distribution requirements (9 credits), plus 7 credits (including a 4 credit seminar course) in this area.

Theory of Architecture 231, 232, distribution requirements (6 credits), plus 6 credits in this area.
Visual Studies in Architecture 151, 152, 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 specifically directed 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 ten-term design sequence. Since this sequence may be accelerated by attending summer terms, seven or eight regular terms 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 terms in residence, taking 35 of the 70 credits (including four terms 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 181 and 182 or the equivalent. Students transferring from a B.Arch. program must be in good standing in their design sequence.

Procedure. Students from Cornell may transfer to the program at the beginning of the fall term 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 must 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 adviser from the history of architecture faculty in the Department of Architecture. Adviser and student together prepare an appropriate two-year course of study according to the following guidelines:

1) 24 credits of 300-level courses in architectural history: ARCH 380 through ARCH 399

2) 12 credits in 600-level architectural history seminars: ARCH 681 through ARCH 699; or 8 credits in a 600-level seminar plus ARCH 499, offered for honors candidates only

3) One 300-, 400-, or 600-level course in architectural theory

4) 24 credits in electives selected in consultation with the student’s adviser

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 achieved 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 300 level, and have completed an honors thesis (ARCH 499) deemed to be of distinguished quality by the history of architecture faculty.

Dual Degree Options

Students can earn both the B.S. and B.Arch. degrees either simultaneously or sequentially. Students who have transferred into the B.Arch. program at Cornell may find this to be a special opportunity for an enlarged and enriched program of study.

Students currently enrolled in the College of Arts and Sciences at Cornell can earn a B.A. in an arts college major and a B.S. in the history of architecture in five years. In this option, students complete a minimum of 150 credits, which includes the B.S. prerequisites and curriculum requirements and 100 credits of the usual distribution and major requirements in the Colleges of 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, 55 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 101 and 502, 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 apply 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 Non-Majors

A special concentration has been formulated specifically for those students not enrolled in the Department of Architecture but who are interested in completing their current academic program with an introduction to various facets of architectural studies. Some students may wish to use the Concentration in Architecture for Non-Majors 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 110 Concentration in Architecture Design Studio (offered fall only, not offered every year) 3 credits or ARCH 103 Elective Design Studio (offered fall only, not offered every year) 6 credits
(ARCH 103 may substitute for ARCH 110; students who complete ARCH 103 must
take all other course requirements for the
concentration.)

ARCH 151 Drawing I (fall only) 2 credits
ARCH 181 or 182 History of
Architecture I or II (ARCH 181,
fall; ARCH 182, spring) 3 credits

Departmental elective courses: A minimum of six credits, including two departmental
elective courses, are required.

Architectural Design

Courses in brackets are not offered this year.
Each student in the architecture program (undergraduate, graduate, and in the Rome
Program) is charged a fee each semester to
help defray the continuing costs of refurbishing
and replacing equipment.

Sequence Courses

ARCH 101 Design I
Fall, spring. 6 credits. Limited to depart-
ment students. Staff.

An 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 102 Design II
Spring. 6 credits. Limited to depart-
ment students. Prerequisite: ARCH 101 and
Staff.

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 201-202 Design III and IV
Fall and spring. 6 credits each term.
Coregistration in ARCH 231–232 and com-
pletion of ARCH 151–152 required. Limited
to department students. Prerequisite for
ARCH 201 is ARCH 102 and ARCH 152.
Prerequisite for ARCH 202 is ARCH 201.
Staff.

Special Design Courses

ARCH 301-302 Design V and VI
Fall and spring. 6 credits each term.
Limited to department students.
Prerequisite for ARCH 301 is ARCH 203.
Prerequisite for ARCH 302 is ARCH 301.
Staff.

ARCH 401-402 Design VII and VIII
Fall and spring. 6 credits each term.
Limited to department students.
Prerequisite for ARCH 401 is ARCH 203.
Prerequisite for ARCH 402 is ARCH 401 or
ARCH 309. Staff.

Programs in architectural design, urban
design, or architectural technology and
environmental science, and other topics.

ARCH 501 Design IX
Fall or spring. 6 credits. Limited to depart-
ment students. Prerequisite: ARCH 402.
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 502 Design X—Thesis
Fall or spring. 8 credits. Prerequisite: ARCH
501 or ARCH 500 and ARCH 510. Required
of all M.Arch. students who have satisfac-
torily completed a thesis. Students accepted
for admission to the Overlap Program are
exempt from the thesis requirement. Staff.

ARCH 601-602 Special Program in
Architectural Design
Fall and spring. 9 credits each term.
Limited to students who have been
accepted into the Overlap Program.
Registration by petition only. Staff.

ARCH 603-604 Special Program in Urban
Design
Fall and spring. 9 credits each term.
Limited to students who have been
accepted into the Overlap Program.
Registration by petition only. Staff.

Graduate Courses

ARCH 511-512 Core Design Studios
Fall and spring. 6 credits. Prerequisites:
ARCH 511 and ARCH 512 for ARCH 512:
limited to M.Arch.I students. Staff.

A two-semester sequence in which
fundamental design skills are taught.
The core studios integrate a broad range
of architectural territories, and students
acquire a command of techniques of design
and representation through a number of
complex architectural problems.

ARCH 513-516 Vertical Design Studios
Fall and spring. 6 credits. Prerequisites:
ARCH 512 and ARCH 513; ARCH 513–516
must be taken in sequence; limited to M.Arch.I students. Staff.

Vertical studios investigate a variety of
programs and project types, from individual
buildings to urban districts. Students will
examine topics of architectural production—
such as building technology, landscape,
urbanism, history, and theory—and their roles
in analysis and design.

ARCH 701-702 Problems in Architectural
Design
Fall and spring. 9 credits each term. Staff.
Basic first-year design course for M.Arch.II
students whose major concentration is
architectural design.

ARCH 703-704 Problems in Urban Design
Fall and spring. 9 credits each term. Staff.
Basic first-year design course for M.Arch.II
students whose major concentration is urban
design.

ARCH 801 Thesis or Research in
Architectural Design
Fall or spring. 9 credits. Prerequisite: ARCH
701 and ARCH 702. Staff.

Second-year design course for M.Arch.II
students whose major concentration is architectural design.

ARCH 802 Thesis or Research in Urban
Design
Fall or spring. 9 credits. Prerequisite: ARCH
703 and ARCH 704. Staff.

Second-year design course for M.Arch.II
students whose major concentration is urban
design.

ARCH 811 Graduate Thesis Proseminar
Fall. 3 credits. Prerequisites: ARCH 515;
limited to M.Arch.I students. Staff.
The first half of the year-long thesis in
architecture, this course covers research
methods and other subjects students employ
in the development of their individual thesis
topics. Emphasis will be placed on learning
different types of theses and developing
specific programmatic design, and site
definition techniques.

ARCH 812 Independent Design Thesis
Spring. 9 credits. Prerequisites: ARCH 516;
limited to M.Arch.I students. Staff.

The Master of Architecture thesis is an
independent design project on a topic
selected by the student and researched in
ARCH 811. The student develops a
thesis statement outlining an area of study
or a problem that has consequences for
contemporary architectural production and
produces a design project that examines it.
Marking the transition between the academic
and professional worlds, the thesis project is
an opportunity for each student to define an
individual position with regard to a specific
aspect of architectural practice.

Elective Design Courses

ARCH 103-104 Elective Design Studio
Fall, spring. 6 credits each term.
Limited to students from outside the
department. Prerequisite for ARCH
103: permission of instructor required.
Prerequisite for ARCH 104: ARCH 103 and
permission of instructor. Staff.

ARCH 200, 300, 400 Elective Design Studio
Fall, spring, or summer. 6 credits. Foreign
summer and Rome Programs only.
Prerequisite: C or better in ARCH 202.
Staff.

ARCH 309 Elective Design Studio
Fall, spring, or summer. 6 credits. Foreign
summer and Rome Programs only.
Prerequisite: C or better in ARCH 202.
Staff.

ARCH 500 Design IX—Alternate Studio
Fall, spring, or summer. 6 credits. Foreign
summer and Rome Programs only.
Prerequisite: C or better in ARCH 402.
Corequisite: ARCH 510. ARCH 500 will be
considered equivalent to ARCH 501 when
taken concurrently with ARCH 510. To
take ARCH 502, one must have a grade
of C or better in ARCH 500 and a passing
grade in ARCH 510. Staff.

For description, see ARCH 401–402.

ARCH 503 Design X
Fall and spring. 6 credits. Limited to depart-
ment students. Prerequisites: ARCH 402 and a passing, but non-advancing,
grade in ARCH 501.

A structured studio for those needing to
retake ARCH 501. The course operates within
the fourth-year design studios. If only ARCH
502 is taken in conjunction with ARCH 503
it can be followed by ARCH 502.

ARCH 504 Design Xa
Fall or spring. 6 credits. Limited to depart-
ment students. Prerequisite: ARCH 503 or
a passing, but non-advancing, grade in
ARCH 502.

A structured studio for those needing to take
an alternative to design thesis. This course
operates within the fourth-year design studios.
The course grade is based on the overall via highly personalized critiques of individual architectural problems in a studio setting. Through a graduated sequence of exercises, 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 course grade is based on the overall performance in the studio with special emphasis on the quality of a major studio project.

ARCH 111 Concentration in Architecture: Design Studio
Summer only. 3 credits. Subject to enrollment. Limited to students not in architecture degree programs. Staff. A course 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 architectural concepts of space, form, function, and technology. Instruction includes critiques of individual student work by department faculty, as well as periodic reviews by guest critics.

ARCH 111 Concentration in Architecture: Design Studio
Fall or spring. 3 credits. Prerequisite: permission of instructor and approved independent study form. Staff.

ARCH 303 Special Problems in Architectural Design
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor. Not offered every year. F. Davis.

ARCH 306 Praxis: Community Design Workshop (also ARCH 606)
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. G. Hascup. Praxis is a workshop-based, hands-on course directed to underserved local and global communities who 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 313.02 Furniture Design (Technology)
Fall or spring. 3 credits. Limited enrollment. Students who wish to earn architecture technology credit must enroll in this section. Prerequisite: Permission of instructor. Not offered every year.

ARCH 313.03 Furniture Design (Free Elective)
Fall or spring. 3 credits. Limited enrollment. Students who wish to earn in-college elective credit must enroll in this section. Prerequisite: permission of instructor. Not offered every year.

ARCH 317 Contemporary Italian Culture
Fall or spring. Variable credit (maximum 3). For students in the Rome Program only. Staff.

ARCH 510 Thesis Introduction
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor. Not offered every year. F. Davis.

ARCH 510 Thesis Introduction
Foreign summer programs and Rome program only. 3 credits. Must be taken in conjunction with ARCH 500. Prerequisite for ARCH 500 is ARCH 402. ARCH 500 will be considered equivalent to ARCH 501 when taken concurrently with ARCH 510 during a foreign summer program or in Rome. Staff. Lectures, seminars, and independent research leading to complete development of the student's thesis program. General instruction in the definition, programming, and development of a thesis.

ARCH 521 Professional Practice
Fall or spring. 3 credits. Staff. An examination of organizational and management theories and practices for delivering professional design services. Included is a historic overview of the profession and a review of the architect's responsibilities from the precontract phase through construction. Application of computer technology in preparing specifications.

ARCH 522 Professional Seminar
Fall or spring. 3 credits. Prerequisite: ARCH 411 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 605 Special Problems in Design
Fall and spring. Variable credit (maximum 3). Prerequisite: permission of instructor. Staff.

ARCH 606 Praxis: Community Design Workshop (also ARCH 306)
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. F. Davis.

ARCH 610 Graduate Design Seminar
Fall. 3 credits. Intended for, but not limited to, graduate students in the Architectural Design and Urban Design Program. Not offered every year. Staff.

ARCH 611-612 Urban Housing Developments
Fall, 611; spring, 612. 3 credits each term. Limited to fourth- and fifth-year students in architecture and graduate students. Prerequisite: permission of instructor. Not offered every year. Staff.

Architectural Theory

ARCH 130 An Introduction to Architecture: Lectures
Summer. 3 credits. Open to nonarchitecture majors in college, high school students in eleventh and twelfth 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.

ARCH 231 Architectural Analysis I
Fall or spring. 2 credits. Architecture students must register concurrently with ARCH 201. Staff. Advanced analytical studies focusing on complex architectural spaces, objects, images, and representations.

ARCH 334 Column, Wall, Elevation, Facade: A Study of the Vertical Surface in Architecture (also ARCH 634)
Fall or spring. 3 credits. Limited to third-year level 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 337 Special Investigations in the Theory of Architecture I
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form. Staff. Independent study.

ARCH 338 Special Topics in the Theory of Architecture I
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. Staff. Topic is announced before preregistration.

ARCH 339 Elements, Principles, and Theories in Japanese Architecture
Spring. 3 credits. Not offered every year. L. Minn and C. Pearson.
An 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 341 Theory of Architecture

ARCH 342 Architecture as a Cultural System
Spring. 3 credits. Can substitute ARCH 445, 446, 447, or 448 with permission of instructor. B. MacDougall.
What have been the major issues in the theory and practice of architectural design through time and across cultures, and how is aesthetic judgment related to more general systems of ordering within a particular society or group? This course deals with 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 ideal and formal relationships between folk and monumental traditions in complex societies; the structure of the ideal social order and its refraction in the material world; cosmological models and architectural form; geometries of non-Western traditions; and the relationship between indigenization and culture change.

ARCH 349 Undergraduate Investigations in Architecture, Culture, and Society
Fall and spring. Variable credit (maximum 5). Prerequisite: permission of instructor and approved independent study form. B. MacDougall. Independent study.

ARCH 441-442 Special Topics in Architecture, Culture, and Society
Fall and spring. 3 credits each term. Prerequisite: permission of instructor. B. MacDougall. Topic to be announced before preregistration.

ARCH 445 Architecture and the Mythic Imagination

ARCH 447 Architectural Design and the Utopian Tradition

ARCH 467-468 Architecture in Its Cultural Context I and II

ARCH 469 Graduate investigations in Architecture, Culture, and Society
Fall and spring. Variable credit (maximum 4). Prerequisite: permission of instructor and approved independent study form. B. MacDougall. Independent study.

Visual Studies

ARCH 151 Drawing I
Fall. 2 credits. Staff. Freehand drawing with emphasis on line and perspective representation of form and space.

ARCH 152 Drawing II
Spring. 2 credits. Prerequisite: ARCH 151. Staff. Freehand drawing as a means of conceiving and expressing spatial form, line weight, shades and shadows, and figure drawing.

ARCH 450 Architectural Publications

ARCH 456 Special Investigations in Visual Studies
Fall or spring. Variable credit (maximum 3). Prerequisites: permission of instructor and approved independent study form. Staff. Independent study.

ARCH 551-552 Techniques in Visual Representation I and II
Fall and spring. 3 credits. Prerequisite: M.Arch I students or permission of the instructor. Staff. These courses explore the practice of drawing through analog and digital methods. They serve as an introduction to visualization and representation skills necessary to the development of architectural thought. Students will learn a broad range of techniques and tools in relation to one another.

ARCH 565 Special Investigations in Visual Studies II
Fall or spring. Variable credit (maximum 4). Prerequisites: permission of instructor and approved independent study form. Staff. Independent study.

ARCH 569 Special Topics in Visual Studies II
Fall or spring. 3 credits. Prerequisite: permission of instructor. Staff. Topics announced before preregistration.

ARCHITECTURE 131
[ARCH 364 Vertigo Structures (also ARCH 664)]

ARCH 365 Bridge Design (also ARCH 665)
Fall or spring. 3 credits. Prerequisite: ARCH 363 or equivalent. Limited enrollment. Not offered every year. M. Gravellier.

There can be no denying the major visual impact of bridges on the built environment. And yet, during the past century, architects have virtually abandoned the role that they have historically had 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 in this course 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 366 The Tectonic Articulation of Structure (also ARCH 666)
Fall or spring. 3 credits. Prerequisite: ARCH 363 or equivalent. Limited enrollment. Not offered every year. J. Ochshorn.

Through a series of readings, exercises, and case studies, students investigate ways in which structural forces can be expressed in works of architecture. Both the structural basis of form as well as the formal articulation of structure are considered. Course objectives include: gaining insight into the behavior of structure; investigating the cultural meaning of structure and technology; and exploring the interaction of structure and form.

ARCH 463 Special Topics in Structures
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: ARCH 263, 264, and 363 or permission of instructor. Not offered every year. Staff.

Topics announced before preregistration.

ARCH 473 Special Investigations in Structures
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form. Staff.

Independent study.

ARCH 563 Structural Concepts
Fall or spring. 3 credits. Prerequisite: M.Arch. 1 students or permission of the instructor. Staff.

For description, see ARCH 263.

ARCH 564 Structural Elements
Fall or spring. 3 credits. Prerequisite: M.Arch. 1 students or permission of the instructor. Staff.

For description, see ARCH 264.

ARCH 663 Structural Systems
Fall or spring. 3 credits. Prerequisite: M.Arch. 1 students or permission of the instructor. Staff.

For description, see ARCH 363.

ARCH 664 The Tectonic Articulation of Structure (also ARCH 366)
Fall or spring. 3 credits. Prerequisite: ARCH 363 or equivalent. Limited enrollment. Not offered every year. J. Ochshorn.

For description, see ARCH 366.

ARCH 665 Bridge Design (also ARCH 365)
Fall or spring. 3 credits. Prerequisite: ARCH 363 or equivalent. Limited enrollment. Not offered every year. Staff.

For description, see ARCH 365.

ARCH 666 The Tectonic Articulation of Structure (also ARCH 366)
Fall or spring. 3 credits. Prerequisite: ARCH 363 or equivalent. Limited enrollment. Not offered every year. J. Ochshorn.

For description, see ARCH 366.

ARCH 667 Working Drawings (also ARCH 667)

ARCH 668 The Tectonic Articulation of Structure (also ARCH 666)
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: ARCH 262 or permission of instructor. Not offered every year. Staff.

Topics announced before preregistration.

ARCH 674 Special Investigations in Construction
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form. Staff.

Independent study.

ARCH 675 Special Investigations in Construction
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form. Staff.

Independent study.

ARCH 676 Building Technology, Materials, and Methods
Fall or spring. 3 credits. Prerequisite: M.Arch 1 students or permission of the instructor. Staff.

For description, see ARCH 262.

ARCH 677 Working Drawings (also ARCH 367)

Environmental Control

ARCH 261 Environmental Control—Site Planning
Spring. 3 credits. Staff.

The 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 361 Environmental Control II—Lighting and Acoustics
Fall. 3 credits. Staff.

Basic properties and principles of sound and light. Sound phenomena, noise control, absorption, acoustical design; light, color, and form. Natural lighting possibilities and constraints as well as good and bad examples of artificial lighting.

ARCH 362 Environmental Control II—Mechanical and Passive Solar Systems
Spring. 3 credits. Staff.

Basic thermal analysis of buildings, human comfort criteria, energy conservation, passive solar design, HVAC distribution systems, overview of mechanical conveying systems, and plumbing.

ARCH 464 Special Topics in Environmental Control
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: ARCH 261, 361, and 362 or permission of instructor. Not offered every year. Staff.

Topics announced before preregistration.

ARCH 474 Special Investigations in Environmental Control
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form. Staff.

Independent study.

ARCH 661 Environmental Control I—Lighting and Acoustics
Fall or spring. 3 credits. Prerequisite: M.Arch.1 students or permission of the instructor. Staff.

For description, see ARCH 361.

ARCH 662 Environmental Control II—Mechanical and Passive Solar Systems
Fall or spring. 3 credits. Prerequisite: M.Arch.1 students or permission of the instructor. Staff.

For description, see ARCH 362.

Computer Applications

ARCH 374 Computer Graphics I (also COM S 465)
Fall. 3 credits. Prerequisite: COM S/ENGRD 211. Staff.

For description, see COM S 465.

ARCH 476 Special Topics in Computer Applications
Fall or spring. 3 credits. Limited to 30 students. Prerequisite: ARCH 374 or 379 or permission of instructor. Not offered every year. Staff.

Topics announced before preregistration.

ARCH 477-478 Special Projects in Computer Graphics

ARCH 479 Advanced Computer Graphics: Virtual Reality (also ARCH 679)
Fall. 3 credits. Prerequisite: an introductory course in computer graphics or computer science, or permission of instructor; upper-level undergraduate or graduate status. H. Richardson.

The course explores the role of synthetic imaging and computer graphics in architectural design. The first half of the course is devoted to examining 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 part of the course 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,
Directed Electives

[ARCH 380 History of Theory
Not offered 2004-2005.]

[ARCH 381 From Eutopia to the Gheto:
Renaissance Urban Form
Fall or spring. 3 credits. Prerequisites:
ARCH 181–182 or permission of instructor.
Not offered every year. M. Lasansky.

Significant developments in European urban
design from 1300-1600. Particular attention
will be awarded to Italy and Spain. The
course focuses on a series of case studies:
entire towns, specific urban spaces, and
individual building types. Weekly discussions
contextualize the city within a larger
cultural framework. We will consider how
civic, economic, social, political, legislative,
technical, and material concerns have had a
significant impact on the form, function,
and patronage of these places, spaces, and
structures. The relevance of Renaissance
theory to contemporary practice is also
emphasized through the discussion of several
twentieth-century urban plans and built
projects.

[ARCH 384 The Urban Landscape of
Renaissance Rome: 1450–1600
Fall or spring. 3 credits. Prerequisites:
ARCH 181–182 or permission of instructor.
Not offered every year. M. Lasansky.

This class is an exploration into the urban
morphology, architecture, and civic life of
Renaissance Rome. The city was a thriving
center for architectural practice. It drew
practitioners from throughout the peninsula
and served as an important theoretical model
for architects elsewhere. We survey the
important issues, individuals, and building
projects of the city between 1450 and 1600
with particular emphasis on the intellectual
and physical rediscovery and re-appropriation
of Antiquity; the role of the Vatican with its
large population of pilgrims, tourists,
resident church officials, foreign bankers, and
dignitaries that made specific demands of the
built environment; and their unique topography
and natural resources of the city’s location.
The last portion of the course addresses the
legacy of the Renaissance during the period of
Italian unification and the Fascist regime.

[ARCH 391 American Architecture and
Building II (also AM ST 391)
Fall or spring. 3 credits. Prerequisites:
ARCH 181–182 or permission of instructor.
Not offered every year. M. Woods.

A continuation of ARCH 390 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 392 Modern Architecture on Film
Fall or spring. 3 credits. Prerequisites:
ARCH 181–182 or permission of instructor.
Not offered every year. M. Woods.

An 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
emphasizes to include the modern house and
housing, the modern city, technology and
visions of the future, and finally the image of
the architect. Representations of these themes
in other forms such as painting, photography,
theater, literature, and advertising also are
examined. The course includes readings in modern architecture and film,
screenings in class, class discussions,
presentations, and papers.

[ARCH 393 The Cumulative City
Not offered 2004–2005.]

[ARCH 396 Special Topics in the History
of Architecture and Urbanism
Fall or spring. 3 credits. Prerequisites:
ARCH 181–182 or permission of instructor.
Not offered every year. Staff.
Topics to be announced.

[ARCH 397 Special Topics in the History
of Architecture and Urbanism
Fall or spring. 3 credits. Prerequisites:
ARCH 181–182 or permission of instructor.
Not offered every year. Staff.
Topics to be announced.

[ARCH 399 Special Topics in the History
of Architecture and Urbanism
Fall or spring. 3 credits. Prerequisites:
ARCH 181–182 or permission of instructor.
Not offered every year. Staff.
Topics to be announced.

Graduate Seminars in the History of
Architecture and Urbanism
All topics for ARCH 682 to ARCH 699 will be
announced prior to the start of the semester.

ARCH 680 Seminar in Historiography
Fall. 4 credits. Prerequisite: permission of
instructor. Staff.

Historiographic and methodological issues
are examined in relation to the history of
architecture and urbanism. Taught by different
faculty members in successive years, the
seminar is required of all first- and second-
year graduate students in the History of
Architecture and Urbanism Program.
ARCHITECTURE, ART, AND PLANNING 2004–2005

[ARCH 668 Seminar in Seventeenth- and Eighteenth-Century Architecture and Urbanism
Not offered 2004–2005.]

[ARCH 669 Seminar in Twentieth-Century Architecture and Urbanism
Not offered 2004–2005.]

[ARCH 690 Seminar in American Architecture, Building, and Urbanism

ARCH 691 Seminar in Special Topics in the History of Architecture and Urbanism
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

ARCH 692 Seminar in Nineteenth-Century Architecture, Building, and Urbanism

ARCH 693 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 694 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 695 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 696 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 697 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 698 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 699 Seminar in Special Topics in the History of Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

Independent Study, Dissertation

ARCH 299 Undergraduate Independent Study in the History of Architecture and Urbanism
Fall or spring. Variable credit (maximum 5). Prerequisite: permission of instructor. May not be taken by students in design to satisfy undergraduate history requirements. Staff. Independent study for undergraduate students.

ARCH 499 Undergraduate Thesis in the History of Architecture and Urbanism
Fall or spring. 4 credits. For B.S. honors candidates in history only. Staff.

ARCH 799 Graduate Independent Study in the History of Architecture and Urbanism
Fall or spring. Variable credit (maximum 12). Prerequisite: permission of instructor. Staff. Independent study for graduate students only.

ARCH 899 M.A. Essay in the History of Architecture and Urbanism
Fall or spring. 4 credits. Staff. Independent preparation of the M.A. essay, often developed from topics investigated in ARCH 680.

ARCH 999 Ph.D. Dissertation in the History of Architecture and Urbanism
Fall or spring. Variable credit (maximum 12). Staff. Independent study for the doctoral degree.

ART


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 to be an excellent preparation for a career 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 painting, sculpture, photography, printmaking, 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. All members of the faculty in the Department of Art are practicing, exhibiting artists, whose work represents a broad range of expression. All members of the faculty in the Department of Art are practicing, exhibiting artists, whose work represents a broad range of expression. 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 adviser 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 freshman 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

130 credits are required for the B.F.A. degree. A minimum of 62 are taken in the Department of Art. A minimum of 57 are taken outside the Department. The required courses for each concentration are as follows:

Painting: ART 121, 221, 321, 322, 421, 422 (Senior Thesis)

Sculpture: ART 141, 241, 341, 342, 441, 442 (Senior Thesis)

Printmaking: ART 131/132/133 (2 of 3); 231, 232, 233 (1 of 3); 331, 431, 432 (Senior Thesis)

Photography: ART 161, 261, 263; 264, 265, 361 (1 of 3); 461, 462 (Senior Thesis)

Dual Concentration

Students interested in studying in more than one area may choose to do a dual concentration. The dual concentration requires a first area, in which the thesis is conducted, and a non-thesis second area. Pre-thesis and thesis must be taken in the first area of concentration. Students take 23 credits in the first area of concentration (22 for printmaking) and 15 credits in the second area of concentration. Drawing is only available as a second area of concentration.

The required courses for the dual concentration are:

First Area of Concentration

Painting: ART 121, 221, 321, 421, 422

Sculpture: ART 141, 241, 341, 441, 442

Printmaking: ART 131/132/133 (2 of 3); 231, 232, 233 (1 of 3); 331, 431, 432

Photography: ART 161, 261, 263/264/265/361 (1 of 4); 461, 462

Credits and Distribution

130 credits are required for the B.F.A. degree. A minimum of 62 are taken in the Department of Art. A minimum of 57 are taken outside the department.

Curriculum

Students are expected to take an average course load of 16 credits per semester during their four years. If a student wishes to take more than three studio courses in any one semester they 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 prior to 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, 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 27 credits in one of the studio areas of painting, sculpture, photography, or printmaking (26 credits). 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 project 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:

Painting: ART 121, 221, 321, 322, 421, 422 (Senior Thesis)

Sculpture: ART 141, 241, 341, 342, 441, 442 (Senior Thesis)

Printmaking: ART 131/132/133 (2 of 3); 231, 232, 233 (1 of 3); 331, 431, 432 (Senior Thesis)

Photography: ART 161, 261, 263; 264, 265, 361 (1 of 3); 461, 462 (Senior Thesis)
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 studio courses at a 200 level or 300 level, a minimum of two "Out of College" studio electives (OCE Studio) of 3-4 credits each, ART 483 Pre-Thesis in Combined Media and ART 492 Thesis in Combined Media.

Note: the total number of in/out-of-college elective credits required will be adjusted to allow for 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 studio courses at a 200 level or 300 level, a minimum of two "Out of College" studio electives (OCE Studio) of 3-4 credits each, ART 483 Pre-Thesis in Combined Media and ART 492 Thesis in Combined Media.

Note: the total number of in/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 adviser and the department chair to obtain signatures of approval for admission to the program. Students in the department 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

## Fall Term (Required Curriculum)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART 400</td>
<td>Rome Studio</td>
<td>4</td>
</tr>
<tr>
<td>ART 401</td>
<td>Requirement for Rome</td>
<td>4</td>
</tr>
<tr>
<td>B.F.A. students, fulfills 4 credits in studio concentration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ART 402</td>
<td>Site Specific Processes</td>
<td>3</td>
</tr>
<tr>
<td>ART 312</td>
<td>Modern Art in Italy</td>
<td>3</td>
</tr>
</tbody>
</table>

## Spring Term (Required Curriculum)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART 317</td>
<td>History of Art in Rome: Early Christian to the Baroque Age</td>
<td>4</td>
</tr>
<tr>
<td>or</td>
<td>ART 318</td>
<td>History of Art in Rome: Renaissance in Rome and Florence</td>
</tr>
<tr>
<td>or</td>
<td>ART 372.20</td>
<td>Special Topics in Art History (spring only)</td>
</tr>
<tr>
<td>ITALIA 111/112</td>
<td>Italian Language</td>
<td>4</td>
</tr>
</tbody>
</table>

**Students may add by approved petition to take 19 credits in Rome.**

### Out-of-College Requirements

A minimum of 57 electives credits must be taken outside of the college. In the first year, students must take two freshman 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, 260, 265, 270, 360, 362, 365, 366, 367, 370, 477, 464.
- **Non-Western:** for example, 290, 339, 378, 380, 383, 384, 385, 386, 395, 396, 470, 490, 571.

Three electives: any art history elective at the 300-level or above or any architectural history elective. (Note: course offerings may vary each semester. Students are encouraged to consult with their adviser. Students may petition to substitute courses of similar content.)

The university requirement of two terms in physical education must be met.

For those students matriculating in fall of 2004:

- Students are required to take ART 111, Introductory Art Seminar; ART 121, Introductory Painting; or ART 141, Introductory Sculpture, Art History elective; and a Freshman Writing Seminar during the fall semester of the freshman year. ART 131/132/133/134, Introductory Printmaking, Art History elective; and an additional Freshman Writing Seminar must be taken during the spring semester of the freshman year. A 300-level course in theory and criticism must be taken sometime during the junior or senior year.

Courses that will fulfill the theory and criticism requirement (note: offerings may change from year to year. Check the current course catalog):

- ARCH 447
- ART 170
- ART 312 (Rome students only)
- ART H 367, 370, 377, 422, 463, 464, 466, 494, 571, 594
- ENGL 395
- GERST 660
- GOVT 375
- HS&SC 304, 503
- ANTH 320, 322, 453
- THETR 376
The M.F.A. Program

The Master of Fine Arts program requires four terms of full-time study, equal to a minimum of 60 credits. Graduate work done elsewhere or in the summer session is not applicable to the M.F.A. degree. The curriculum leading to the master's degree is flexible to accommodate the needs of the individual student and to enable the student to partake of the greater Cornell community. The ratio of graduate faculty to students allows an exceptional opportunity for individual mentoring. Graduate students are provided individual studios and have 24-hour access to studios and labs. Graduate students in art may enroll in introductory or advanced courses in any field of study offered at the university. Fifteen credits are required in each term; of these, nine credits are in studio work, and three credits are in Graduate Seminar (ART 611, 612, 623, 624). Students are required to take at least twelve credits of academic work outside the Department of Art during their four terms in residence. Candidates for the Master of Fine Arts degree must have completed eighteen credits in the history of art in the course of their graduate and/or undergraduate study. Every M.F.A. candidate must prepare a written statement, offer a thesis exhibition of studio work completed during residency, and give an oral defense of the written statement and visual thesis. Gallery space is provided for a one-week solo thesis exhibition during the final spring semester.

Course Information

Most courses in the Department of Art are open to students in any college of the university who have fulfilled the prerequisites or have permission of the instructor. Fees are charged for all studio courses. See the specific course description for course fees. To take advantage of the special opportunities afforded by summer study, there are several course offerings during summer session.

Guidelines for Independent Study

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

Courses in Theory and Criticism

ART 111 Introductory Art Seminar
Fall. 1 credit. Limited to B.F.A. students. S.U. only. Staff.
Students meet each week with a different member of the faculty. The varying art interests of the faculty are presented and discussed. A maximum of two absences are allowed except by permission of chairman.

ART 170 Visual Imaging in the Electronic Age
Fall or spring. 3 credits. D. Greenberg.
This is an 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, which concentrates on "why" rather than "how." Topics will 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 precursors, primarily from the art world. Also included are other modes of imaging.

Related Courses

ART 209 Site Specific Processes
Fall or spring. 3 credits. Prerequisite: ART 251 or permission of instructor. Staff. This studio course will investigate materials, methods, and processes specific to Rome. The Italian experience and specifically the city of Rome will be used to engage in artistic practices not readily available on the Ithaca campus. The methods to be studied in workshop settings could include fresco, painting, egg tempera, watercolor, paper making, wood carving, stone carving, mosaics, and ceramics. The final project will involve the use of one or more processes presented in a site-specific installation.

ART 214 Art and the Multicultural Experience
Fall. 3 credits. R. Dalton. This course will investigate selected topics related to art and the multicultural experience. Students will 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 312 Modern Art in Italy
Fall or spring. 3 credits. Rome Program only. Staff. This course introduces students to contemporary art in Rome through studio visits, gallery exhibitions, and museum collections. Lectures by artists, critics, and others. Traces art from idea to realization and explores the gallery and its relationship to artists and to promotion of art, the role of the art critic and museum, and art collecting. Fulfills the 300-level theory and criticism requirement for fine arts majors.

ART 317 History of Art in Rome: Early Christian to the Baroque Age

ART 318 History of Art in Rome: Renaissance in Rome and Florence
Not offered every year. Staff. This course surveys art from the beginning of the fifteenth century to Michaelangelo'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 419 Independent Study/Supervised Readings in Art
Fall, spring, or summer. 4 credits variable. Prerequisite: student must be a junior in good academic standing and have the written permission of the 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.

ART 570 Theory Seminar
Fall and spring. 4 credits. Priority given to AAP and Art History graduate students. F. M. Spector and M. Fernandez. This seminar will introduce students in art, art history, and architecture to diverse theoretical texts of relevance to the three fields. Readings will include classic texts in post-structural theory and more recent writings in new areas of theory and artistic practice, including digital...
ART 611 Professional Skills for the Visual Artist
Spring. 3 credits. Limited to M.F.A. students. Staff.
This seminar will help fine arts graduate students build professional skills that will assist them in their careers as practicing artists and in their work at art-related employment. Students will complete a resource notebook that will be useful to them in the years after they graduate. Topics include: funding resources, exhibition opportunities, employment options, documentation of work, health, safety, and legal issues.

ART 612 Recent Practice in the Visual Arts
Fall. 3 credits. Limited to M.F.A. students. Staff.
This seminar is designed to provide graduate students with an overview of recent visual artwork. Students will study work from a wide range of artists who have received significant recognition within the visual art community. Reviews of major exhibitions such as Documenta, La Biennale di Venezia, and the Whitney Biennial are discussed. Students will be encouraged to travel to nearby cities to look at contemporary work.

ART 613 On-Line Publication for the Visual Artist
Fall. 3 credits. Limited to M.F.A. students. Staff.
This seminar is 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 614 Contemporary Theory in the Visual Arts
Spring. 3 credits. Limited to M.F.A. students. Staff.
This seminar explores selected writings on the current issues represented within the visual arts. It is 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 623 Contemporary Theory and Visual Criticism
Fall. 3 credits. Limited to M.F.A. students. Staff.
This seminar explores selected writings on current issues in the visual arts. It is 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 624 Current Criticism in the Visual Arts
Spring. 3 credits. Limited to M.F.A. students. Staff.
This seminar is 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.

Studio Courses in Painting

ART 121 Introductory Painting
Fall, spring, or summer. 3 credits. Staff.
This course 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 221 Painting II
Fall or spring. 4 credits. Prerequisite: ART 121 or permission of instructor. Staff.
This course is an introduction to painting through color, form, space, and light. Projects are developed within the context of historical and contemporary artistic expression.

ART 321 Painting III
Fall or spring. 4 credits. Prerequisite: ART 221 or permission of instructor. Staff.
This course is an advanced study of painting media 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 twentieth century are used as well as developing technologies applicable to the painting process.

ART 322 Painting IV
Fall or spring. 4 credits. Prerequisite: ART 321 or permission of instructor. Staff.
This course is an 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 421 Pre-Thesis in Painting
Fall or spring. 6 credits. Prerequisite: ART 422. Staff.
This course is an advanced study of painting through assigned and independent projects using a variety of materials leading to the formulation of a thesis project.

ART 422 Thesis in Painting
Fall or spring. 6 credits. Prerequisite: ART 421. Staff.
This course is an independent study of painting through assigned and independent projects using a variety of materials leading to the formulation of a thesis project.

ART 429 Independent Studio in Painting
Fall, spring, or summer. 4 credits, variable. Prerequisite: student must be a junior in good academic standing and have the written permission of the instructor. Staff.
This course is an 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 their progress and evaluate their results.
ART 233 Lithography II  
Spring. 4 credits. Prerequisite: ART 133. Staff.  
The 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 234 Large Format Digital Printing  
Fall and spring. 4 credits. Prerequisites: ART 161, 171, and one of the following: ART 131, 132, 133 or permission of instructor. Staff.  
This course will focus on the use of digital printing and its use in combination with traditional forms of printmaking. Students will explore various approaches to image making while also utilizing traditional materials and media, including relief, monotype, lithography, screen printing, intaglio, transfers, collage, and photomechanical processes. Students will use appropriate software, including Adobe Photoshop, Quarkexpress, Final Cut Pro, and Adobe illustrator to draw from both still and video base sources. Students will work with large format inkjet printers.

ART 331 Printmaking III  
Fall or spring. 4 credits. Prerequisite: ART 231, 232, or 233 or permission of instructor. Staff.  
The course is the 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 332 Printmaking IV  
Fall. 4 credits. Prerequisite: ART 331 or permission of instructor. Staff.  
This course is a continuation and expansion of ART 331.

ART 431 Pre-Thesis in Printmaking  
Fall or spring. 6 credits. Prerequisite: ART 332. Staff.  
This course is a 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 432 Thesis in Printmaking  
Fall or spring. 6 credits. Prerequisite: ART 431. Staff.  
Advanced printmaking project to demonstrate creative ability and technical proficiency.

ART 439 Independent Studio in Printmaking  
Fall, spring, or summer. 4 credits, variable. Prerequisites: student must be a junior in good academic standing and have the written permission of the instructor. Staff.  
This course is an 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 their progress and evaluate their results.

ART 731-732, 831-832 Graduate Printmaking  
Fall, 731, fall; 732, spring; first-year M.F.A. students. 9 credits. 831, fall; 832, spring; second-year M.F.A. students. 9 credits. Staff.  
Students are responsible, under faculty direction, for planning their own projects and selecting the media in which they will work. Members of the faculty are available for consultation; discussion sessions of work in progress are held.

ART 141 Introductory Sculpture  
Fall, spring, or summer. 3 credits. Staff.  
A series of studio projects introduce the student to the basic principles of artistic expression in three-dimensions, i.e., clay modeling, direct plaster, plaster casting, and construction in wood, metal, and other materials.

ART 241 Sculpture I  
Fall or spring. 4 credits. Prerequisite: ART 141 or an architecture design studio, or permission of instructor. Staff.  
Various materials, including clay, plaster, wood, stone, and metal, are used for exercises involving figurative modeling, abstract carving, and other aspects of three-dimensional form and design. Beginning in the second year, students are encouraged to explore bronze/metal casting processes.

ART 341 Sculpture II  
Fall or spring. 4 credits. Prerequisite: ART 241 or permission of instructor. Staff.  
This course is a continued study of the principles of sculpture and conceptual development. Each student chooses the selection and expressive use of materials, media, scale, and content. Group discussions and individual criticism. Experimentation is encouraged.

ART 342 Sculpture IV  
Fall or spring. 4 credits. Prerequisite: ART 341 or permission of instructor. Staff.  
This course is a continuation and expansion of ART 341. Special projects may include site-specific and/or large-scale installations.

ART 343 Sculpture V  
Fall or spring. 4 credits. Prerequisite: ART 342 or permission of instructor. Staff.  
This course is a continued study of the principles of sculpture and the selection and expressive use of materials and media. Group discussions and individual criticism.

ART 441 Pre-Thesis in Sculpture  
Fall or spring. 6 credits. Prerequisite: ART 342. Staff.  
This course is a further study of the art of sculpture through both assigned and independent projects executed in various media. Instruction through group discussions and individual criticism. Students complete a body of work through an approved statement of purpose and proposed schedule.

ART 442 Thesis in Sculpture  
Fall or spring. 6 credits. Prerequisite: ART 441. Staff.  
Advanced sculpture project to demonstrate creative ability and technical proficiency culminating in a cohesive B.F.A. thesis exhibition.

ART 449 Independent Studio in Sculpture  
Fall, spring, or summer. 4 credits variable. Prerequisites: student must be a junior in good academic standing and have the written permission of the instructor. Staff.  
This course is an 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.

ART 741-742, 841-842 Graduate Sculpture  
741, fall; 742, spring; first-year M.F.A. students. 9 credits. 841, fall; 842, spring; second-year M.F.A. students. 9 credits. Staff.  
Students are responsible, under faculty direction, for planning their own projects and selecting the media in which they are to work. All members of the faculty are available for individual consultation. Weekly discussion sessions of works in progress are held.

Studio Courses in Photography  
Darkroom fees for photography courses:
Fee for black-and-white courses: $135
Fee for color courses: $215
Fee for an additional black-and-white course taken the same term: $55
Fee for an additional color course taken the same term: $135

ART 161 Photography I  
Fall, spring, or summer. 3 credits. Staff.  
This course is a 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 168 Black-and-White Photography  
Summer. 3 credits. 3-week session only. Staff.  
This course is 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 169 Color Photography  
Summer. 3 credits. 3-week session only. Staff.  
This course is 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 261 Photography II  
Fall, spring, or summer. 4 credits. Prerequisite: ART 161 or ARCH 251, or permission of instructor. Staff.  
This course is a continuation of Photography I concentrating on black-and-white photographic processes, history and theory of creative practice, and individual projects.

ART 263 Color Photography  
Fall and summer. 4 credits. Prerequisite: ART 161 or ARCH 251, or permission of instructor. Staff.  
This course is a studio course in color photography with emphasis on camera skills, darkroom techniques, and the content of color photography.
This course is an independent studio in
nonsilver photographic processes. Emphasis
is on camera skills, basic techniques and
processes, image content, and creative use of
photo processes.

ART 265 Studio Photography
Fall or spring. 4 credits. Prerequisite: ART
161 or ARCH 251, or permission of instruc-
tors.
A 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 361 Photography III
Fall, spring, or summer. 4 credits.
Prerequisite: ART 360, 261, or permission of
instructor. Staff.
This course is the continued study of creative
use of photography, with emphasis on
specialized individual projects.

ART 461 Pre-Thesis in Photography
Fall or spring. 6 credits. Prerequisite: ART
261, 263, Staff.
This is a studio course intended for
photography majors and other qualified
students.

ART 462 Thesis in Photography
Fall or spring. 6 credits. Prerequisite: ART
461. Staff.
This is a studio course intended for
photography majors and other qualified
students. Advisor for a photography project to
demonstrate creative ability and technical
proficiency.

ART 469 Independent Studio in
Photography
Fall, spring, or summer. 4 credits, variable.
Prerequisites: student must be in senior
standing and have the written permission of the
instructor. Staff.
This course is an 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.

ART 761-762, 861-862 Graduate
Photography
761, fall; 762, spring; first-year M.F.A.
students. 9 credits. 861, fall; 862, spring;
second-year M.F.A. students, 9 credits.
Staff.
Students are responsible, under faculty
direction, for planning their own projects
and selecting the media in which they will
work. Members of the faculty are available for
consultation. Discussion sessions of work in
progress are held.

Studio Courses in Drawing

Fee for all drawing courses: $25

ART 151 Drawing I
Fall, spring, or summer. 3 credits. Staff.
This 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.

ART 152 Drawing II
Spring. 3 credits. Prerequisite: ART 151.
Staff.
This is a general course in drawing that
emphasizes figure study and life drawing. This
course builds on the foundation of ART 151
and concentrates on the analytical study of the
figure. Students explore a variety of materials,
traditional and contemporary.

ART 159 Conceptual Drawing
Summer. 3 credits. Six-week session only.
Staff.
This course puts emphasis on drawing from
the imagination. The generation of ideas and
their development in sketches is stressed.
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 251 Drawing III
Fall. 3 credits. Prerequisite: ART 152. Staff.
This course is an intermediate drawing
course where students study composition, the
articulation of form, and the illusion of space
in a variety of materials. Expressive content,
conceptualization, and the exploration of
materials are stressed.

ART 252 Drawing IV
Spring. 3 credits. Prerequisite: ART 251.
Staff.
An advanced drawing course with emphasis
on life drawing and figure composition.
Individual expression is encouraged along
with creative investigation of materials and
processes.

ART 459 Independent Studio in Drawing
Fall, spring, or summer. 4 credits, variable.
Prerequisites: student must be a junior in
good academic standing and have the
written permission of the instructor. Staff.
This course is an independent studio in
drawing that allows the student the
opportunity to pursue special interests not
paid 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

Course fees:
171, 372, 479 $250
271, 272 $105
391, 392 $ 50
481, 482, 489 $ 70

ART 162 Electronic Imaging in Art
Fall or spring. 3 credits. Staff.
This course is an introductory studio course
using the computer as a tool for making
art. Students explore various approaches to
2- and 3-D software programs and various
functions. This course is an introduction to the web.

ART 271 Electronic 3-D Modeling and
Animation
Fall or spring. 4 credits. Prerequisite: ART
171. Not offered every year. Staff.
This is a studio course in creating 2- and
3-D still and animated images using computers
and 3-D software for object modeling,
animation, and rendering. This course
concentrates on the web.

ART 272 Digital Video and Sound
Fall or spring. 4 credits. Prerequisite: ART
171. Not offered every year. Staff.
This is a studio course that introduces
students to digital video including capture
devices, animation, video, and sound with an
introduction to interactive presentation and
CD-ROM production. This course concentrates
on the web.

ART 273 Computer Animation (also CIS
518)
Fall. 4 credits. D. Greenberg.
This course focuses on techniques of
computer animations. It combines critical
readings with studio projects that employ a
variety of animation software. Topics covered
are modeling, storytelling, 2-D and 3-D
keyframe animation, motion and kinematics,
lighting effect and shading, texturing and
material properties, physical simulation, and
cinematography.

ART 372 Special Topics in Art Studio
Fall, spring, or summer. 4 credits, variable.
Staff.
This course is an exploration of a particular
theme or project.

ART 372.20 Special Topics in Art History
Spring. 4 credits, variable. Rome Program
only. Staff.
Topic to be announced.

ART 379 Independent Studio in Rome
Fall and spring. 4 credits, variable.
Prerequisites: student must be in junior in
good academic standing, and have the
written permission of the instructor. Rome
Program only. Staff.
This course is an 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 their progress and evaluate
the results.

ART 391 Media Arts Studio I (also ARCH
498/659, FILM 391, DANCE 391)
Fall, 3 credits. Prerequisites: FILM 277 or
377. student must be a junior and have
permission of the instructor. Lab fee $50.
Staff.
For description, see FILM 391.

[ART 392 Media Arts Studio II
Not offered 2004-2005.]

ART 400 Rome Studio
Fall or spring. 4 credits. Rome Program
only. Content for the Rome studio is
determined by the instructor. Prerequisite:
permission of instructor. Fee: $60.
Additional fees apply 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 400 fulfills four credits of
the concentration requirement.
ART 479 Independent Studio in Electronic Imaging
Fall, spring, or summer. 4 credits, variable. Prerequisites: student must be a junior in good academic standing and have the written permission of the instructor. Staff. This course is an 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 their progress and evaluate their results.

ART 481 Pre-Thesis in Combined Media
Fall or spring. 6 credits. Prerequisite: written permission of instructor on a combined media thesis form must be received in the art department prior to enrollment in the course. Students must enroll in the pre-thesis course in their primary area of concentration. Staff. In this course students are responsible, under faculty direction, for planning their own projects and selecting the media in which they will 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 482 Thesis in Combined Media
Fall or spring. 6 credits. Prerequisites: ART 481 and written permission of instructor on a combined media thesis form must be received in the art department prior to enrollment in this course. Students must enroll in the thesis course in their primary area of concentration. Staff. In this course students are responsible, under faculty direction, for planning their own projects and selecting the media in which they will work. The 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 499 Independent Studio in Combined Media
Fall, spring, or summer. 4 credits, variable. Prerequisites: student must be a junior in good academic standing and have the written permission of the instructor. Staff. This course is 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.

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. Students who graduate from the program receive a Bachelor of Science degree. The program provides both an excellent liberal education and a strong concentration of studies respecting urban and regional issues. The urban and regional studies courses in the program provide students with a broad understanding of relevant issues, the ability to assess those issues, and technical analysis skills. The URS Program is truly interdisciplinary. Students learn to evaluate urban and regional problems by using a wide range of analytic tools and disciplinary perspectives.

Basic Degree Requirements (for students in the graduating class of 2005 and earlier)
Requirements for graduation: URS requirements include: 1) eight semesters of residence; 2) 120 credits; 3) two freshman seminars; 4) qualification in one foreign language; 5) four groups of distribution requirements; 6) required courses for major; 8) free electives; 9) a minimum of 34 courses; and 10) completion of the university requirement of two one-credit nonacademic courses in physical education. Please note that physical-education credit does not count toward graduation or toward the 12-credit minimum required for good academic standing each semester. Please note that no course may satisfy more than one requirement.

1. General education
   a. Freshman writing seminars: two courses
   b. Foreign language: three courses or qualification in one foreign language
   c. Distribution Requirement: nine courses

   Students must take a total of nine courses for the distribution requirement: four courses (of three or more credits each) from Groups 1 and 2, 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, 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 the 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)

Advanced Placement Credit
Students in the graduating class of 2006 and earlier 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 above, if they complete at least one science course during their undergraduate career. They may apply no advanced placement credit toward the distribution requirement in Groups 3 and 4. Grades of S-U courses cannot be applied to the distribution requirements.

Students in the graduating classes of 2007 and later may apply NO advanced placement or transfer credit to general education requirements in Groups 1 through 4 (sciences, quantitative reasoning, social sciences/humanities/arts).

2. Required Courses for the Major in Urban and Regional Studies: five courses

   CRP 100 The American City
   CRP 101 The Global City: People, Production, and Planning in the Third World
   Statistics (at least 3 credits from approved list below)
   AEM 210 Introduction to Statistics
   BTRY 261 Statistical Methods
   ECON 219 Introduction to Statistics and Probability
   ILRST 210 Statistical Reasoning I
   MATH 171 Statistical Theory and Application in the Real World
   SOC 301 Evaluating Statistical Evidence (II)
   microeconomics course (at least 3 credits, from an approved list)
   architecture course (at least 3 credits)

3. Area Requirements for the Major in Urban and Regional Studies: 11 courses
Students must take one CRP course in each of the following six areas: design, economics, environment, history, politics/policy, and quantitative analysis.

The URS approved area requirements list is available in 106 W. Shelby Hall. Students must take any additional five CRP courses (of at least 3 credits each, letter grade only).

NOTE: Cornell in Washington Program: GOVT 500 Politics/Policy: Theory, Research, and Practice can be used to fulfill four credits toward additional CRP course requirement.

4. Free Electives: six to nine courses

5. Physical Education (two terms)
Required courses for graduation: 34
Required credits: 120

New requirements for students in the graduating class of 2007 and after
General Education: same as graduating class of 2006 and earlier.
Distribution Requirements: same as graduating class of 2006 and earlier
(For a complete listing of courses in Groups 1 through 4, consult the Courses of Study catalog, College of Arts and Sciences section on “Distribution Requirements.” Note that the Arts and Science distribution requirement has been changed for entering freshmen in that college (class of 2007). Rather than selecting courses from Groups 3 (social sciences and history) and 4 (humanities and the arts), as of fall semester 2004, Arts and Sciences...
students will be 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 also encouraged to select their Group 3 and Group 4 courses from four of these five categories.)

Required Courses for the Major in Urban and Regional Studies: seven courses

CRP 100: The American City (fall, 3 credits)
CRP 101: The Global City: People, Production, and Planning in the Third World (spring, 3 credits)
CRP 106: URS First-Year Seminar (spring, 1 credit)
CRP 200: The Promise and Pitfalls of Contemporary Planning (fall, 3 credits)
CRP 201: People, Planning and Politics in the City (spring, 3 credits)
ECON 101: Microeconomics (both semesters, 3 credits)

Area Requirement: six CRP courses

A. Design and Land Use (one course)
B. Urban History, Society, and Politics (one course)
C. Environment (one course)
D. Regional Development and Globalization (one course)
E. Methods for Planning and Urban Studies (two courses)

Either CRP 331 or CRP 332
CRP 331: Preparation for Urban Fieldwork (spring, 3 credits)
CRP 332: Urban Policy Research Seminar (fall, 3 credits)

OR an equivalent research course approved by the URS Director

And one of the following:

CRP 328: Overview Quantitative Methods in Public Policy Analysis
CRP 408: Introduction to Geographic Information Systems
CRP 395.54: Regional Economic Impact Analysis
CRP 425: Quantitative Methods for Urban Analysis (4 credits)

This requirement is also satisfied by GOVT 300, Methods Research Design and Qualitative Methods (Cornell in Washington) OR an equivalent research methods course approved by the URS director.

URS-Approved Area Requirements List (available in program office).

Concentrations

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 and 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 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.

Nine (9) credits of required core courses:

CRP 100: American Cities (3 credits)
CRP 101: The Global City: People, Production, and Planning in the Third World (3 credits)
CRP 200: The Promise and Pitfalls of Contemporary Planning (3 credits)

And 9 credits of elective department courses at the 300 level or higher.

(Please consult the 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 (URS concentration advisor) also 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.

The department recognizes concentrations earned within the university (accepting standards set by various colleges). 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, and formal notification is received by the AAP Registrar, the concentration will be recorded on the student's official transcript.

Off-Campus Opportunities

Cornell in Washington Program. Students in good standing may earn degree credits in the Cornell in Washington program through course work and an urban-oriented externship in Washington, D.C. Students may work as externs with congressional offices, executive-branch agencies, interest groups, research institutions, and other organizations involved in the political process and public policy. Students also select one or two other 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. Current programs are available in Great Britain, Spain, and Germany. Opportunities in Asia, the Middle East, and France should be forthcoming. We encourage URS students to explore these opportunities.

Cornell-in-Rome Program. The College of Architecture, Art, and Planning has a teaching facility in Rome located in the sixteenth-century Palazzo Massimo. Students in good standing can earn degree credits through courses taken with Cornell faculty members assigned to Rome and with accredited instructors. Courses are available in areas of urban development, regional development, and architecture and design.

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. Urban and regional studies 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 project are required for the M.R.P. degree. Interested students apply to the Graduate School, usually in the senior year.

Dual degree option. 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. Special requirements have been established for this dual degree program. 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 for further information.

Admissions Requirements and Procedures

Among the most important criteria for admission to the Urban and Regional Studies Program are intellectual potential and commitment—a combination of ability, achievement, motivation, diligence, and use of educational and social opportunities. Nonacademic qualifications are important as well. The department encourages students with outstanding personal qualities, initiative, and leadership ability. Above all, the department seeks students with a high level of enthusiasm and depth of interest in the study of urban and regional issues. Applicants must complete a university admission application.

Transfer Students

In most cases, transfer applicants should no longer be affiliated with a high school and should have completed no fewer than 12 credits of college or university work at the
time of application. High school students who have completed graduation requirements at midyear and are taking college courses for the rest of the academic year should apply as freshmen. Applicants who believe that their circumstances are exceptional should consult with the Director of Admissions in the Cornell division of interest to them before filing an application.

Forms for transfer application and financial aid are available from the Cornell University Office of Admissions, 719 Thayer 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 transfers should have taken at least 6 credits in English. In addition, students should have taken basic college-level courses distributed across the natural and social sciences, humanities, and mathematics.

Applicants whose previous course work closely parallels the "General Education" requirements of the Urban and Regional Studies curriculum will have relative ease in transferring. Nevertheless, students with other academic backgrounds, such as engineering, architecture, fine arts, management, and agriculture, are eligible to apply.

Although an interview is not required, applicants are urged to visit the campus. Applicants who want further information regarding the Urban and Regional Studies Program, may contact Professor B. Lynch, Program Director, Urban and Regional Studies, Cornell University, 106 West Sibley Hall, Ithaca, NY 14853-6701 (telephone: 607-255-2186).

**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 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 mid-career 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 utilization 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 economics 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 have advanced, specialized education for a career in teaching, research, or policy making.

**Off-Campus Opportunities**

Rome Program. Graduate students have the opportunity to spend one or two semesters in Rome, studying at Cornell's center at the Palazzo Massimo. Instruction is given by Cornell professors-in-residence and by other faculty. The program is structured to include work assignments in one of the international development organizations headquartered in Rome.

**Course Information**

Most courses in the Department of City and Regional Planning are open to students in any college of the university who have fulfilled the prerequisites and have the permission of the instructor. The department attempts to offer courses according to the information that follows. However, students should check with the department at the beginning of each semester for late changes.

**Undergraduate Program in Urban and Regional Studies**

**CRP 100** The American City

Fall. 3 credits. S-U grades optional for out-of-department students only. W. W. Goldsmith.

An 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 twentieth-first century. Readings, discussions, and brief papers explore topics ranging from suburban development to downtown revitalization, and from environmental threats to downtown revitalization, and from municipal finance to the new position of women in the urban economy.

**CRP 101** The Global City: People, Production, and Planning in the Third World

Spring. 3 credits. S-U grades optional for out-of-department students only. N. Kudva.

A critical look at the physical and social development of giant cities in the Third World. Their origins, roles, contributions, and shortcomings are examined. Their place in world political economy is evaluated. Policy prescriptions for their principal problems are discussed.

**CRP 106** URS First-Year Seminar

Spring. 1 credit. S-U grades only. B. Lynch.

This seminar 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 200** The Promise and Pitfalls of Contemporary Planning

Fall. 3 credits. Prerequisite: CRP 100. K. Reardon.

An 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 will be examined through a combination of readings, lectures, films, guest speakers, and field trips. Students will acquire a deeper understanding of professional practice by working with local officials to develop community-development profiles for several Ithaca neighborhoods.

**CRP 201** People, Planning, and Politics in the City

Spring. 3 credits. Prerequisites: CRP 100 and CRP 101. J. Forester.

This seminar examines various bases of political and professional power. What do professionals who want to 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 261** Fieldwork in Urban Archaeology (also LA 261)

Fall. 3 credits. S. Baugher.

For description, see LA 261.

**CRP 293** Inequality, Diversity and Justice (also GOVT 293, PHIL 193, SOC 293)

Fall. 4 credits. R. Mitroff.

For description, see PHIL 193.

**CRP 309** Community Development Seminar (also CRP 509)

Spring. 3 credits. Letter grade: K. Reardon.

The seminar provides an introduction to the theory, method, and practice of contemporary community development. Topics examined include: the role community-based organizations are playing in promoting sustainable development in distressed communities; the contribution planners are making to enhancing the organizational capacity of community organizations; and the interactions between neighborhood-based community development activities and regional economic development policy-making.

**CRP 318** Politics of Community Development (also CRP 518)

Spring. 3 credits. Letter grade: P. Clavel.

A 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 321** Introduction to Quantitative Methods for the Analysis of Public Policy

Spring. 3 credits. Not offered every year.

An introduction to the role and use of quantitative methods in the study of urban and regional issues. This course focuses on various types of models commonly used to analyze urban and regional policy, including regression models, cost-benefit analysis, simulation, and others.
CRP 328 Overview: Quantitative Methods in Policy Planning (also CRP 528)
Fall. 3 credits. S-U grades optional. Staff.
This course introduces students to the basic tools at the heart of policy analysis. Its goal is to set the scene 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 330 Neighborhood Planning Workshop (also CRP 530)
Spring. 4 credits. Letter grade. K. Reardon.
This workshop offers students the opportunity to collaborate with local residents, leaders, and officials in the development of revitalization plans that address the critical environmental, economic, and social challenges confronting their neighborhoods. A participatory action research approach is used to co-produce professional-quality development plans with local stakeholders.

CRP 331 Preparation for Urban Fieldwork
Spring. 2 credits. Letter grade only.
Prerequisite: Urban Scholars status or permission of instructor. Staff.
Students are introduced to the key theories, methods, and challenges of experiential education, service-learning, reflective practice, and urban ethnography, in preparation for field-based learning and research experiences with nonprofit organizations and local government agencies that serve distressed urban communities. Topics include principles of experiential learning, learning contracts, participant observation, informal/formal interviewing skills, creating critical-incident journals, managing field relations, professional ethics, ethnographic report-writing, and urban social science.

CRP 332 Urban Policy Research Seminar on New York City
Fall. 3 credits. Open to students who have successfully completed the Cornell Urban Scholars, Adult Literacy, or Urban Semester Programs or permission of instructor(s). S-U grades optional. Staff.
This course is designed to enhance students' organizational, analytical, research, and communication skills in producing scholarly articles of publishable quality that critically examine important urban policy issues affecting the lives of New York City's poorest children, families, and neighborhoods. Students will produce policy-oriented journal articles that address vital issues confronting the city's most vulnerable residents, whom they've identified while working in Cornell-sponsored summer internships with nonprofit organizations and public agencies that provide direct services to the poor.

CRP 343 Affordable Housing Policy and Programs (also CRP 643)
Fall. 3 credits. S-U grades optional. R. Pendall.
An overview of federal, state, and local policies and programs to deliver affordable housing to low-income people; public housing, vouchers,incluisionary zoning, rent control, and much more. Lectures, debates, short papers, and term paper.

CRP 354 Introduction to Environmental Planning (also CRP 554)
Spring. 3 credits. A-M. Esnard.
An 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, inventoring, and risk analysis.

CRP 360 Pre-Industrial Cities and Towns of North America (also LA 260/546 and CRP 566 and CRP 666)

CRP 361 Seminar in American Urban History (also CRP 661)
Fall or spring. 3 credits. Prerequisite: permission of instructor. M. Tomlan.
Seminar in the historical evolution of the American city. Emphasis on factors in urban growth, the process of urbanization, the urban reform movement, and intellectual and social responses to the city.

CRP 363 American Indians, Planners, and Public Policy (also CRP 547 and LA 263/547/581)

CRP 368 The History of Urban Form in America (also CRP 668)
Fall. 3 credits. Letter grades. M. Tomlan.
This course covers the history of city planning in America from colonial times to the early twentieth century, including brief reviews of European influences on urban form. Lectures, discussions, and short papers.

CRP 370 The Regional Question: The Case of Italy
Spring. 4 credits. For majors in urban and regional studies only. Rome Program only. Staff.
The "regional problem" in Italy has long interested regional planners, economists, sociologists, and political scientists. This course makes use of field trips to the Italian Mezzogiorno and the North to explore theoretical and practical aspects of regional inequality. The question of how Italy's integration into the European Union affects and is affected by its regional issues will be considered.

CRP 371 Cuba: The Search for Development Alternatives

CRP 372 Twentieth-Century Italy: Politics and Society
Spring. 3 credits. S-U grade option for out-of-department students only. Staff.
This is a 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 376 Latin American Cities (also CRP 676)

CRP 378 Recycling and Resource Management (also CRP 578)
Spring. 3 credits. S-U grades optional. Not offered every year. R. Young.
Advanced sanitation, waste recycling and management systems are critical 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 compound practical exposure to leading practitioners and best practices in the recycling field. Open to undergraduate and graduate students. Graduate students have additional research requirements.

CRP 380 Environmental Politics
Fall. 4 credits. Letter grade. R. Booth.
Examines the politics of public decisions affecting the environment. Focuses on the roles played by different political actors, the powers of various interest groups, methods for influencing environmental decisions, and the political and social impacts of those decisions.

CRP 381 Principles of Spatial Design and Aesthetics (also CRP 581)
Fall. 3 credits. Limited to 30 students. T. Trancik.
A lecture course that introduces the spatial and visual design vocabularies of cities and regions. Students learn the basic principles and theories of design, and the roles played by different political actors, the powers of various interest groups, methods for influencing environmental decisions, and the political and social impacts of those decisions.

CRP 384 Green Cities (also CRP 584 and LA 495)
Fall. 4 credits. S-U grades optional. Not offered every year. R. Young.
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 environmental systems with a special focus on green infrastructure. Students learn about the history and future of urban environmental systems, with a special focus on green infrastructure.

CRP 395 Special Topics
Fall, spring, summer. 4 credits. Variable. Hours to be arranged. Staff.
For description, see department coordinator, 106 Wendell.

CRP 395.03 Wilderness and Wildlands: Issues in Policy and Planning (also CRP 679.03)
Fall. 2-3 credits variable. Graduate seminar open to juniors and seniors. Not offered every year. J. Thordike.
Wilderness and wildlands are under assault by the Congress, the "Wild Use" movement, property-rights activists, polluters, and the actual users. This seminar will consider historical and philosophical foundations and political factors that impact
decisions about wilderness policies, planning, acquisition, protection, and management. The role of government, professional planners, and management of special interests, the legal system, citizens, and user groups will be examined. Practical exposure to planning and policy development through readings, discussions, guest practitioners, and a field trip to the Finger Lakes National Forest. Optional weekend trip to Adirondack Park Wilderness area.

**CRP 395.60 Gender and Globalization**
(also FGSS 360)
Fall. 3 credits. L. Beneria.
For description, see FGSS 360.

**[CRP 400 Introduction to Urban and Regional Theory]**

**[CRP 401 Seminar in Urban Political Economy]**

**CRP 404 Urban Economics**
(also CRP 504)
Spring. 4 credits. Prerequisite: microeconomics. M. Drennan.
Urban phenomena are analyzed 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 408 Introduction to Geographic Information Systems (GIS)**
(also CRP 508)
Spring. 4 credits. A-M. Esnard.
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. Topics 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 412 Devolution, Privatization, and the New Public Management**
(also CRP 612, AEM 433/533, and FGSS 411/611)
Fall. 4 credits. Prerequisite: ECON 101 or equivalent course. S-U grades optional. M. Warner.
This course 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, intergovernmental 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 client 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 term.

**CRP 416 European City: The Public Sphere and Public Space**
Spring. 4 credits. Open to all juniors and seniors. S-U option available to non-majors. Enrollment may be limited by the instructor. Rome Program only. Staff.
An examination of the social, economic, and political life of the European city, particularly Italian cities, especially Rome. Study of the socio-economic underpinnings of the city. How are cities organized, and how do citizens relate to the state: the city to the nation; the nation to the global market? How and where do different groups of people live? How do they travel, inside the city and from city to city? How are new parts of the city developed and old ones preserved, transformed, or destroyed? What public services do people expect, and how are they delivered? What is the role of private business? How do Italians/Europeans confront problems of the urban environment, poor neighborhood services, and impoverished immigrants? In all these cases, how do Italian (or European) conditions and policies differ from those in the United States (or elsewhere)?

**CRP 417 Economic Development: Firms, Industries, and Regions**
(also CRP 517)
Spring. 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 multifirm and workforce development are being implemented. This comparative course draws on cases from a variety of industries and national contexts. Particular attention is paid to economic development issues and policies in New York State.

**CRP 418 Government Policy Workshop**
(also CRP 618, AEM 434/634 and FGSS 420/620)
Students undertake research requested by clients (associations of local government, union, non-profit, federal, and international agencies) to analyze and identify alternative approaches to restructuring government-service delivery. The course requires teamwork and includes qualitative and quantitative methods of analysis in collaboration with clients.

**CRP 442 Emerging Global Environmental Trends**
(also CRP 543)

**CRP 444 Resource Management and Environmental Law**
(also CRP 544 and NTRES 444)
Spring. 4 credits. Open to juniors, seniors, and graduate students, and by permission of instructor. R. Booth.
This course introduces the application of legal concepts and principles to the management of natural resources and natural-resource areas. It 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 448 Social Policy and Social Welfare**
(also CRP 548)
Spring. 3 credits. S. Christopherson.
This course 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 conceptions 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 of the course examines how economic change and government policy affect social provision in the United States.

**CRP 451 Environmental Law**
(also CRP 551)
Fall. 4 credits. R. Booth.
An introduction to how the legal system handles environmental problems. Study of federal environmental statutes (e.g., the National Environmental Policy Act, the Clean Air Act, and the Clean Water Act) and important judicial decisions that have been handed down under those statutes and federal regulations. Discussions cover environmental-law topics from a policy-management perspective. This course is designed for undergraduate and graduate students interested in urban issues, planning, natural resources, government, environmental engineering, law, business, architecture, landscape architecture, and other topics. Course assignments for graduate students differ in some aspects from those for undergraduates.

**CRP 453 Environmental Aspects of International Planning**
(also CRP 683)
Fall. 4 credits. Open to advanced undergraduate and graduate students in planning, environmental studies, and related social and natural sciences. B. Lynch.
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 477 Issues in African Development**
(also CRP 677)
Fall and spring. 1 credit. S-U grades only. M. Ndulo.
This course 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 490 Student-Faculty Research**
Fall or spring. 4 credits. Variable. Limited to undergraduate students in the 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 492 Honors Thesis Research**
Fall or spring. 4 credits. Limited to Urban and Regional Studies Program majors who have been selected as honor students by the department faculty. Each selected student works with his or her thesis adviser.

**CRP 493 Honors Thesis Writing**
Fall or spring. 4 credits. Prerequisite: completion of CRP 492. Staff. Each selected student works with his or her thesis adviser.

**CRP 497 Supervised Readings**
Fall or spring. 4 credits. Variable. Limited to juniors and seniors. Prerequisite: permission of instructor. Staff.

**Graduate Courses and Seminars**
Courses numbered from 500 to 599 and 600 to 699 are generally considered introductory or first-year courses; those numbered from 700 to 799 and 800 to 899 are generally considered more advanced. Upper-level graduate courses are numbered from 800 to 899. (Undergraduates with the necessary prerequisites and permission of the instructor may enroll in courses numbered 500 and above.)

**CRP 504 Urban Economics (also CRP 404)**
Spring. 4 credits. Prerequisite: microeconomics. M. Drennan. For description, see CRP 404.

**CRP 508 Introduction to Geographic Information Systems (GIS) (also CRP 408)**
Spring. 4 credits. A.-M. Esnard. For description, see CRP 408.

**CRP 509 Community Development Seminar (also CRP 309)**
Spring. 3 credits. K. Reardon. For description, see CRP 309.

**CRP 512 Public and Spatial Economics for Planners**
Fall. 3 credits. No prior knowledge of economics necessary. M. Drennan. 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.

**CRP 513 Introduction to Planning Practice and History**
Fall. 4 credits. N. Kolda. An 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 517 Economic Development: Firms, Industries, and Regions (also CRP 471)**
Spring. 4 credits. S. Christopherson. For description, see CRP 417.

**CRP 518 Politics of Community Development (also CRP 318)**
Spring. 3 credits. P. Clavel. For description, see CRP 318.

**CRP 519 Urban Theory and Spatial Development**
Spring. 3 credits. W. W. Goldsmith. This course surveys theories on the existence, size, location, and functioning of cities and their metropolitan areas in rich and poor regions of the world. We consider 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 520 Statistical and Mathematical Concepts for Planning**
Fall. 3 or 4 credits. Not offered every year. Staff.
An 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 521 Mathematical Foundation for Planning Analysis**
Fall. 1 credit. S-U grades only. Meets for two hours, once each week, for approximately half the semester. 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. Departmental permission required.

**CRP 525 Introductory Methods of Planning Analysis**
Fall. 4 credits. R. Pendall. A course on quantitative and qualitative analysis of neighborhoods, cities, and regions. Focus is on data from various regions of the United States, but tools are applicable throughout the world. They include: descriptive and inferential statistics, mapping, and observation. Required lab exposes students to essential microcomputer applications and builds skills in writing and analysis.

**CRP 528 Overview: Quantitative Methods in Policy Planning (also CRP 328)**
Fall. 3 credits. S-U grades optional. Staff. For description, see CRP 328.

**CRP 529 Mathematics for Planners**
Fall. 4 credits. Variable. S-U grades optional. Staff.
The course covers basic mathematical concepts and techniques—such as 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 530 Neighborhood Planning Workshop (also CRP 330)**
Spring. 4 credits. K. Reardon. For description, see CRP 330.

**CRP 532 Real Estate Development Process**
Fall. 3 credits. Letter grade. Fee for case-studies packet. B. Olson.
Examination of various forms of development as well as the role of major participants in the processes. Review of issues in residential, retail, industrial, office, and low-income housing projects. Guest speakers and case studies included.

**CRP 533 Real Estate Marketing and Management**
Spring. 3 credits. R. Abrams.
The course 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. Office buildings are considered in detail while key elements common to the operation and marketing of all types of property are reviewed. Topics include examination of tenant types, factors creating preferred locations, building services and operations, negotiation of lease agreements, marketing campaigns, and governmental regulations. Guest speakers and case studies included.

**CRP 537 Real Estate Seminar Series**
Fall and spring. 1.2 credit per term. Restricted to M.P.L./E. students. S-U grades only. B. Olson.
A one-credit course 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 543 Emerging Global Environmental Trends (also CRP 443)**

**CRP 544 Resource Management and Environmental Law (also CRP 444 and NTRES 444)**
Spring. 4 credits. R. Booth. For description, see CRP 444.

**CRP 545 Introduction to Quantitative Methods for the Analysis of Public Policy**
Fall. 3 credits. R. Pendall. An introduction to econometrics, covering bivariate and multivariate regression. Applications include population, unemployment, and tax revenue forecasting for subnational...
CRP 546 Introduction to Community and Environmental Dispute Resolution
Fall. 3 credits. J. Forester.
This course 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 547 American Indians, Planners, and Public Policy (also CRP 363 and LA 263/LA 547)]

CRP 548 Social Policy and Social Welfare (also CRP 448)
Spring. 4 credits. S. Christopherson.
For description, see CRP 448.

CRP 549 Ethics and Practical Judgment in Planning
Spring. 4 credits. variable. Not offered every year. Staff.
An introduction to problems of practical judgment and ethics as they arise in planning and public-serving professional practice. Issues such as consent, interests, deliberation, and legitimacy are central concerns.

CRP 551 Environmental Law (also CRP 481)
Fall. 4 credits. R. Booth.
For description, see CRP 451.

CRP 552 Land-Use Planning
Fall. 3 credits. A.-M. Esnard.
Course covers surveys, analyses, and planning techniques for guiding physical development of urban areas, location requirements, space needs, and interrelations of land uses. Emphasis is on residential, commercial, and industrial activities and community facilities, and housing and neighborhood conditions. Lectures, seminars, and field exercises.

CRP 553 Land-Use Regulations
Spring. 3 credits. R. Pendall.
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, planned-unit development, and more.

CRP 554 Introduction to Environmental Planning (also CRP 354)
Spring. 3 credit. A.-M. Esnard.
For description, see CRP 354.

CRP 555 Urban Systems Studio (also LA 701)
Fall. 5 credits. Prerequisite: permission of instructor. R. Trancik.
Application of urban-design and town-planning techniques to specific contemporary problems of city environments. Issues of urbanism are investigated and applied to physical-design interventions involving the street, square, block, garden, and park systems. Topics covered in the studio include urban land-use development, spatial systems and aesthetics, and public and private implementation of urban-design plans. Computer modeling and digital-design media are introduced as tools for urban design. This is a specially arranged collaborative studio with the Landscape Architecture Program.

CRP 556 Design in Real Estate Development
Spring. 3 credits. S-U grades optional. M. Schack.
This course 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 of location 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 557 City Planning Design Studio
Spring. 4 credits. Prerequisite: previous design courses or permission of instructor. Not offered every year. Staff.
A series of individual and team small-area design projects at district, neighborhood, and project scale. The course objective is to develop an understanding of the spatial issues, knowledge, and skills needed to design for the functional, aesthetic, social, and cost needs of communities. Studio projects, field trips, and reading.

CRP 558 City and Regional Planning Workshop
Fall or spring. 4 credits variable. S-U grades optional. R. Pendall.
Students work on urban issues, such as housing, traffic, and parking, economic development, zoning, and related planning issues with public or nonprofit organizations in New York State. Projects are undertaken on a community-service basis for "clients" who specifically request planning assistance. Students work individually or in teams.

CRP 560 Documentation for Preservation
Fall or spring. 3 credits. M. Tomlan.
Methods of identifying, recording, collecting, processing, and analyzing information dealing with historic and architecturally significant structures, sites, and objects.

CRP 561 Historic Preservation Planning Workshop: Surveys and Analyses
Fall or spring. 3 credits. M. Tomlan.
Course covers techniques for the preparation of surveys of historic structures and districts; identification of American architectural styles, focusing on upstate New York; and explorations of local historical resources, funding sources, and organizational structures. Lectures and training sessions. Emphasis on fieldwork with individuals and community organizations.

CRP 562 Perspectives on Preservation
Fall. 3 credits. M. Tomlan.
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 563 Problems in Contemporary Preservation Practice
A review and critique of ongoing preservation projects and an investigation of areas of expertise currently being developed. Presented by staff and guest lecturers.

CRP 564 Building Materials Conservation
Spring. 3 credits. Open to juniors, seniors, and graduate students. M. Tomlan.
A survey of the development of building materials in the United States, chiefly during the nineteenth and early twentieth centuries, and a review of the measures that might be taken to conserve them.

CRP 565 Fieldwork or Workshop in History and Preservation
Fall or spring. Variable credit. M. Tomlan.
Work on applied problems in history and preservation planning in a field or laboratory setting or both.

CRP 566 Planning and Preservation Practice
Fall. 1 credit. Prerequisite: standing in CRP programs or M.P.S./R.E. or permission of instructor. 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 567 Measured Drawing
Fall. 3 credits. For undergraduate architecture students and graduate students in history and preservation. Prerequisite: permission of instructor. M. Tomlan.
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 569 Archaeology in Preservation Planning and Site Design (also LA 569)]

CRP 578 Recycling and Resource Management (also CRP 378)
Spring. 3 credits. S-U grades optional. R. Young.
For description, see CRP 378.

CRP 581 Principles of Spatial Design and Aesthetics (also CRP 381)
Fall. 3 credits. Course enrollment limited to 30 students. R. Trancik.
For description, see CRP 381.

CRP 584 Green Cities (also CRP 384 and LA 495)
Fall. 4 credits. S-U grades optional. R. Young.
For description, see CRP 384.

CRP 605 Urban Public Finance
Fall. 4 credits. Prerequisite: prior exposure to microeconomics. M. Drennan.
An 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 607 GIS Applications Workshop
Fall. 4 credits. Prerequisites: an introductory GIS course or permission of instructor. A.-M. Esnard.
This course is an advanced GIS class that focuses upon GIS applications and projects for one or more clients. During some semesters students will work on their own projects.
Contact the instructor directly to learn about project options for the current semester.

CRP 612 Devolution, Privatization, and the New Public Management (also CRP 412, AEM 433/633 and FGSS 411/611)
Fall. 4 credits. Prerequisite: ECON 101 or equivalent course. S-U grades optional. M. Warner.
For description, see CRP 412.

CRP 614 Gender and International Development (also FGSS 614)
Spring. 3 credits. L. Beneria.
This course has four main objectives: 1) to provide an analysis of the location of women in development processes and to understand the centrality of gender in each case; 2) to examine theoretical and conceptual frameworks for the analysis, including an understanding of gender divisions and their interaction with other forms of inequality such as class, race, and ethnicity; 3) to reflect upon the linkages between the global economy and the macro and micro processes of development from a gender perspective and 4) to provide a basis for research, practical action, and policy formulation and for evaluating directions and strategies for social change.

CRP 616 Globalization and Development
Spring. 3 credits. Not offered every year. L. Beneria.
This course concentrates on the current dynamics of national and international development, the globalization of national economies, and the forces and trends that are shaping this process. Beginning with an analysis of restructuring taking place since the late 1960s, the emphasis is on the factors affecting the new international division of labor and production, the labor market, consumption, trade and finance, and the redistribution of resources. This includes the analysis of processes through which the current neoliberal model has been built, such as trade liberalization, labor-market flexibility, the erosion of nation states as economic units, and the formation of trade blocks and global institutions, and the discussion of current debates about future directions.

CRP 618 Government Policy Workshop (also CRP 418, AEM 434/634, and FGSS 420/620)
For description, see CRP 418.

CRP 621 Quantitative Techniques for Policy Analysis and Program Management
Spring. 4 credits. D. Lewis.
Selected analytical techniques used in the planning and evaluation of public policy and public investments are examined. Topics include simulation modeling, benefit-cost and cost-effectiveness analysis (including capital budgeting), and optimization strategies.

CRP 631 Local Economic Policy—Field Workshop

CRP 632 Methods of Regional Science (also CRP 332)
Spring. 4 credits variable. Staff.
An 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 will be discussed. Where appropriate, computer implementation emphasizing statistical, econometric models is considered.

CRP 633 Methods of Regional Science and Planning II

CRP 635 Workshop: State Economic Development Strategies
Fall. 4 credits. S-U grades optional. 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 637 Regional Development Planning: An International Perspective
Fall. 4 credits, variable. S-U grades optional. T. Victorisz.
This course develops a broad historical and theoretical context within which urban and regional planning problems across the world are embedded: addresses aspects of the global information economy affecting economic development and cultural identity; and demonstrates how such a broad perspective can make for more viable local plans. From the perspective of commitment to an open society, the course also examines the tension between planning oriented to social equity and the polarizing forces of market fundamentalism.

CRP 638 Planning and the Global Knowledge Economy: Sustainability Issues
Spring. 4 credits, variable. S-U grades optional. T. Victorisz.
The course analyzes the current sustainability crisis in terms of major changes in the social organization of production emphasizing the worldwide economic and cultural shocks created by the emerging knowledge economy. Insight into the dynamics of this transition, in the light of similarly dramatic transitions in the past, can guide attempts to move toward sustainability and high-quality urban and regional living environments.

CRP 642 The Micro-Politics of Participatory Planning Practices
Spring. 4 credits variable.
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 resistance. The approach we take can be called a "critical pragmatism." We use practitioners' oral histories to investigate the challenges of participatory planning practices.

CRP 643 Affordable Housing Policy and Programs (also CRP 343)
Fall. 3 credits. S-U grades optional. R. Pendall.
For description, see CRP 343.

CRP 653 Legal Aspects of Land-Use Planning
Spring. 3 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 655 Real Estate Project Workshop
Spring. 4 credits. Permission of instructor required. Fee for mandatory field trip.
R. Abrams and M. Schack.
Students 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 657 Real Estate Law
Spring. 3 credits. Letter grade. A. Klausner.
Examination of major legal concepts pertaining to acquisition, use, management, and transfer of real estate. Particular focus is on important legal considerations pertaining to property rights, contracts, and public controls on the use of land. Consideration of important case law, statutory law, and rules and regulations. Current legal issues affecting the real estate industry are discussed.

CRP 658 Residential Development
Spring. 4 credits. Letter grade. Fee for mandatory field trip.
R. Olson.
The course explores the residential-development process from site acquisition through delivery of the finished product. Topics covered 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 examined. The 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 661 Seminar in American Urban History (also CRP 361)
Fall or spring. 3 credits. Prerequisite: permission of instructor. M. Tomlan.
For description, see CRP 361.

CRP 662 Historic Preservation Planning Workshop: Plans and Programs
Fall or spring. 1–4 credits. Prerequisite: CRP 561. M. Tomlan.
Preparation of elements of historic preservation plans, designs, legislation, and special studies. Individual or group projects are selected by students. Fieldwork is emphasized.

CRP 663 Historic Preservation Law
Spring. 3 credits. Offered alternate years. R. Booth.
The course covers: law of historic district and landmark designation; tools for preservation (such as police power, taxation, eminent domain); and recent developments in state and federal historic preservation.
CRP 642 Economics and Financing of Neighborhood Conservation and Preservation  
Spring. 3 credits. M. Tomlan.  
The economic and financial aspects of historic preservation and neighborhood conservation. Topics include public finance, selected issues in urban economics, real-estate economics, and private financing of real-estate projects.

CRP 665 Preservation Planning and Urban Change  
Fall. 3 credits. M. Tomlan.  
An examination of fundamental planning concepts and issues as they relate to historic preservation. Neighborhood revitalization, federal housing programs, the role of public and private institutions, displacement, and other social issues are among the primary topics.

[CRP 666 Pre-Industrial Cities and Towns of North America (also CRP 360, LA 260 and LA 666)]  

CRP 668 The History of Urban Form in America (also CRP 368)  
Fall. 3 credits. M. Tomlan.  
For description, see CRP 368.

CRP 670 Regional Planning and Development in Developing Nations  
Fall or spring. 3 credits. Prerequisite: second-year graduate standing. Staff.  
Extensive case studies of development planning are analyzed. Focus is on the political economy of the process of regional development through urbanization and in particular on the concepts of equity and efficiency, external economies, export linkages, and internal self-sufficiency and integration. Resource development, national integration, human development, and migration problems are discussed.

CRP 671 Seminar in International Planning  
Spring. 1 credit. S-U grades only. B. Lynch.  
The international planning lecture series sponsors lectures by visiting scholars or professionals in the field of international development. The only formal requirement for the course is a brief evaluation of the series at the end of the semester.

CRP 672 International Institutions  
Spring. 3 credits. L. Beneria.  
The course focuses on the growth and transformation of international institutions since World War II. The first part includes a discussion of the Bretton Woods institutions and of the U.N. system up to the early 1970s, and how these functions have and evolved over time. The second part examines some of the crises and tensions within the international system since the 1980s and how these have affected institutional change and current debates on reform and global governance.

[CRP 674 Urban Transformations in the Global South (also CRP 474)]  

CRP 675 Workshop on Project Planning in Developing Countries  
Fall. 4 credits. D. Lewis.  
An examination of the problems and issues involved in preparing project proposals for presentation to funding agencies. Topics include technical design, financial feasibility, social-impact analysis, and policy relevance, as well as techniques for effective presentation of proposals. The course is organized as a seminar–workshop providing both an analysis of the critical elements of effective proposals and an opportunity to use those elements in the preparation of proposals. A multidisciplinary perspective is emphasized.

[CRP 676 Latin American Cities (also CRP 376)]  

CRP 677 Issues in African Development (also CRP 477)  
Fall or spring. 1 credit. S-U only. M. Ndulu.  
For description, see CRP 477.

CRP 678 Infrastructure in Developing Countries  
Spring. 4 credits. S-U grades optional. B. Lynch.  
This graduate seminar examines 1) the roles of international institutions, national governments, and private-sector actors in shaping infrastructure policies and major construction projects, 2) the project process from initial proposal to construction, and 3) the implications of big projects for different social groups and economic sectors. It also discusses the intended and unintended consequences of megaprojects and the reasons they become targets of social movement activity.

CRP 679.03 Wilderness and Wildlands: Issues in Policy and Planning (also CRP 395.03)  
Fall. 2–3 credits variable. Graduate seminar open to juniors and seniors. Not offered every year. L. Thorndike.  
For description, see CRP 395.03.

CRP 683 Environmental Aspects of International Planning (also CRP 453)  
Fall. 4 credits. B. Lynch.  
For description, see CRP 453.

[CRP 703 Contemporary Theories of Regional Development]  
Fall or spring. 4 credits. Not offered 2004–2005. Staff.

[CRP 711 Planning and Organization Theory]  
Fall or spring. 4 credits. Not offered 2004–2005. P. Clavel.

CRP 714 Gender, Race, and Class in Planning  
Fall. 3 credits. L. Beneria.  
The course introduces students to the importance of gender, race, and class issues in planning theory and practice. Both domestic and international topics are covered. Discussions, short papers, and term paper required.

[CRP 732 Methods of Regional Science and Planning III]  

[CRP 733 Seminar in Regional Models]  

CRP 790 Professional Planning Colloquium I  
Fall. 1 credit. Staff.  
Visiting lecturers address problems and opportunities in the practice of planning. Topical focus to be announced. The only formal requirement for the course are attendance and a brief evaluation at the semester's end.

CRP 791 Master's Thesis in Regional Science  
Fall or spring. 12 credits, variable. S-U grades optional. Hours to be arranged. Regional Science faculty. Staff.

CRP 792 Master's Thesis, Project, or Research Paper  
Fall or spring. 10 credits, variable. S-U grades optional. Staff.

CRP 794 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 795 Master's Thesis in Preservation Planning  
Fall or spring. 6 credits, variable. Staff.

CRP 796 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 797 Supervised Readings  
Fall or spring. 4 credits, variable. Limited to graduate students. Prerequisites: permission of instructor. Staff.  
For description, see department coordinator, 106 West Sibley.

[CRP 798 Colloquium in Regional Science, Planning, and Policy Analysis]  

CRP 800 Advanced Seminar in Urban and Regional Theory I  
Fall. 3 credits. S. Christopherson.  
An introduction to key conceptual and empirical literature in urban theory. The course focuses on the relationship between political and economic processes and their joint influence on urban spatial form.

[CRP 801 Advanced Seminar in Urban and Regional Theory II]  

[CRP 810 Advanced Planning Theory]  

CRP 830 Seminar in Regional Science, Planning, and Policy Analysis  
Fall or spring. 4 credits, variable. S-U grades only. Staff.  
This seminar 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.
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, and 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 design, 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 497, 524, and 525.

LA 140 The Symbols of New York State's Cultural Landscape
Fall. 3 credits.

LA 141 Grounding in Landscape Architecture
Fall. 4 credits.

LA 142 Grounding in Landscape Architecture
Spring. 4 credits.

LA 155 American Indian Cultural Landscape Changes in Time
Fall. 3 credits.

LA 201 Medium of the Landscape
Fall. 5 credits.

LA 202 Medium of the Landscape
Spring. 5 credits.

LA 260 Pre-Industrial Cities and Towns of North America (also CRP 360, CRP 666 and LA 666)

LA 261 Fieldwork in Urban Archaeology (also CRP 261)
Fall. 4 credits.

LA 262 Laboratory in Landscape Archaeology (also ARKEO 262)
Spring. 3 credits.

LA 263 American Indians, Planners, and Public Policy (also CRP 363/547 and LA 547)

LA 266 Jerusalem through the Ages
Fall. 3 credits.

LA 282 The American Landscape
Fall. 3 credits.

LA 301 Integrating Theory and Practice I
Fall. 5 credits.

LA 302 Urban Design in Virtual Space
Spring. 5 credits.

LA 315 Site Engineering I
Spring. 3 credits.

LA 316 Site Engineering II
Fall. 2 credits.

LA 318 Site Construction
Spring. 5 credits.

LA 402 Integrating Theory and Practice: Community Design Studio
Spring. 5 credits.

LA 403 Directed Study: The Concentration (also LA 603)
Fall or spring. 1 credit.

LA 410 Computer Applications in Landscape Architecture
Fall or spring. 3 credits.

LA 412 Professional Practice
Spring. 1 credit.

LA 486 Placemaking by Design: Theory Seminar
Fall. 5 credits.

LA 491 Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment (also HORT 491)
Fall. 4 credits.

LA 492 Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment
Spring. 4 credits.

LA 494 Special Topics in Landscape Architecture
Fall or spring. 1-3 credits.

LA 495 Green Cities (Also CRP 384/584)
Fall. 4 credits.

LANAR 497 Individual Study in Landscape Architecture
Spring. 1-5 credits; may be repeated for credit. S-U grades optional. L. J. Mirin.

Work on special topics by individuals or small groups.

LA 498 Undergraduate Teaching
Fall or spring. 1-2 credits.

LA 501 Composition and Theory
Fall. 5 credits.

LA 502 Composition and Theory
Spring. 5 credits.

LA 505 Graphic Communication I
Fall. 3 credits.

LA 506 Graphic Communication II
Spring. 3 credits.

LANAR 524 History of European Landscape Architecture
Fall. 3 credits. L. Mirin.

A survey from classical times to the present, emphasizing design principles and techniques that have established the landscape-architecture tradition in Europe. Particular reference is made to the manner in which gardens, streets, plazas, parks, and new towns reflect in their built form, a range of responses to demands of culture, economics, technology, security, the law, and ecology.

LANAR 525 History of American Landscape Architecture
Spring. 3 credits. L. Mirin.

Landscape architecture in the United States from Jefferson to the present is examined as a unique expression of the American experience. Influences exerted by the physical landscape, the frontier and utopian spirit, and the cultural assumptions of democracy and capitalism are traced as they affect the forms of urban parks, private and corporate estates, public housing, transportation planning, national parks, and other open-space designs.

LA 545 The Parks and Fora of Imperial Rome
Spring. 3 credits.
[LA 547] Americans, Indians, Planners, and Public Policy (also CRP 363/547 and LA 263)

[LA 569] Archaeology in Preservation Planning and Site Design (also CRP 569)

LA 580 Landscape Preservation: Theory and Practice
Fall. 3 credits.

LA 582 The American Landscape
Fall. 3 credits.

LA 590 Theory Seminar
Spring. 3 credits.

LA 598 Graduate Teaching
Fall or spring. 1–2 credits.

LA 601 Integrating Theory and Practice I
Fall. 5 credits. Limited to graduate students.

LA 602 Integrating Theory and Practice II
Spring. 5 credits. Limited to graduate students.

LA 603 Directed Study: The Concentration (also LA 403)
Fall or spring. 1 credit.

LA 615 Site Engineering I
Spring. 3 credits.

LA 616 Site Engineering II
Fall. 2 credits.

LA 618 Site Construction
Spring. 5 credits. Weeks 8–15.

[LA 619] Advanced Site Grading

[LA 666] Pre-Industrial Cities and Towns of North America (also CRP 360/666 and LA 260)

LA 680 Graduate Seminar in Landscape Architecture
Fall or spring. 1–3 credits.

LA 694 Special Topics in Landscape Architecture
Fall or spring. 1–3 credits.

LA 701 Urban Design and Planning: Designing Cities in the Electronic Age (also CRP 555)
Fall. 5 credits.

LA 702 Advanced Design Studio
Spring. 5 credits.

LA 800 Master's Thesis in Landscape Architecture
Fall or spring. 9 credits.

FACULTY ROSTER
Azis, Iwan, Ph.D., Cornell U. Visiting Prof., City and Regional Planning.
Baugh, Sherene, Ph.D., SUNY at Stony Brook. Visiting Prof., City and Regional Planning.
Beneria, Lourdes, Ph.D., Columbia U. Prof., City and Regional Planning.
Bertoia, Roberto, M.F.A., Southern Illinois U. Assoc. Prof., Art
Blum, Zevi, B.Arch., Cornell U. Prof. Emeritus, Art
Booth, Richard S., J.D., George Washington U. Prof., City and Regional Planning.
Bowman, Stanley J., M.F.A., U. of New Mexico. Prof. Emeritus, Art
Briggs, Laura, M.Arch., Columbia U. Assoc. Prof., Architecture
Chi, Lily H., M.Phil., Cambridge U. Assoc. Prof., Architecture
Christopherson, Susan M., Ph.D., U. of California at Berkeley. 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.
Crutueller Mark R., M.Eng., Ph.D., McGill U. (Canada) Assoc. Prof., Architecture
Curry, Milton S. F., M.Arch., Harvard U. Assoc. Prof., Architecture
Czamanski, Stan, Ph.D., U. of Pennsylvania. Prof. Emeritus, City and Regional Planning.
Daly, Norman M.A., Ohio State U. Prof. Emeritus, Art
Drennan, Matthew P., Ph.D., New York U. Prof., City and Regional Planning.
Esnard, Ann-Margaret. Ph.D., U of Massachusetts-Amherst. Asst. Prof., City and Regional Planning
Evett, Kenneth W., M.A., Colorado Coll. Prof. Emeritus, Art
Forester, John, Ph.D., U. of California at Berkeley. Prof., City and Regional Planning.
Goehner, Werner H., Dipl. Ing., Technical U. Karlsruhe (Germany). M.Arch., Cornell U. Prof., Architecture
Goldsmith, William W., Ph.D., Cornell U. Prof., City and Regional Planning.
Greenberg, Donald F., Ph.D., Cornell U. Prof., Architecture
Hascup, George E., B.Arch., U. of California at Berkeley. Prof., Architecture
Hodgden, Lee C., M.Arch., Massachusetts Inst. of Technology. Prof. Emeritus, Architecture
Hubbell, Kent L., M.F.A.S., Yale U. Prof., Architecture
Isard, Walter, Ph.D., Harvard U. Prof. Emeritus, City and Regional Planning.
Kira, Alexander, M.R.P., Cornell U. Prof. Emeritus, Architecture
Kord, Victor, M.F.A., Yale U. Prof., Art
Kudva, Neema, Ph.D., U. of California at Berkeley. Asst. Prof., City and Regional Planning.
Lasansky, D. Medina, Ph.D., Brown U. Asst. Prof., Architecture
Levitte, Yael, Ph.D., U. of Toronto. Visiting Lecturer, City and Regional Planning.
Lewis, David B., Ph.D., Cornell U. Prof., City and Regional Planning.
Locey, Jean N., M.F.A., Ohio U. Prof., Art
Lynch, Barbara, Ph.D., Cornell U. Visiting Assoc. Prof., City and Regional Planning.
MacDougall, Bonnie G., Ph.D., Cornell U. Assoc. Prof., Architecture
Mikus, Eleanor, M.A., U. of Denver. Prof. Emeritus, Art
Miller, John C., M.Arch., Cornell U. Prof. Emeritus, Architecture
Olpadwala, Ponus, Ph.D., Cornell U. Prof., City and Regional Planning
Otto, Christian F., Ph.D., Columbia U. Prof., Architecture
Ovaska, Arthur, M.Arch., Cornell U. Assoc. Prof., Architecture
Pearman, Charles W., B.Arch., U. of Michigan. Prof. Emeritus, Architecture
Pendall, Rolf, Ph.D., U. of California at Berkeley. Prof., City and Regional Planning.
Perlis, Barry A., M.F.A., Ohio U. Assoc. 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, N., Ph.D., Cornell U. Prof. Emeritus, City and Regional Planning.
Saul, Francis W. M.S., Harvard U. Assoc. Prof. Emeritus, Architecture
Schack, Mario L., M.Arch., Harvard U. Arthur L. and Isabel B. Wiesenberger Prof. Emeritus, Architecture
Seraji, Nasrine, Dipl. Arch., Architectural Assoc. School of Arch. London. Prof., Architecture
Shaw, John P., M.Arch., Massachusetts Inst. of Technology. Prof. Emeritus, Architecture
Siminitz, Andrea, B.Arch., Cornell U. Assoc. Prof., Architecture
Singer, Arnold, Prof. Emeritus, Art
Spector, Buzz, M.F.A., U. of Chicago. Prof., Art
Squier, Jack L., M.F.A., Cornell U. Prof., Art
Stein, Stuart W., M.C.P., Massachusetts Inst. of Technology. Prof. Emeritus, City and Regional Planning.
Tom, W. Stanley, M.F.A., California College of Arts and Crafts. Assoc. Prof., Art
Tomlan, Michael A., Ph.D, Cornell U. Assoc. Prof., City and Regional Planning.
Ungers, O. Mathias, Diploma, Technical U. Karlsruhe (Germany). Prof. Emeritus, Architecture
Vietorius, Thomas, Ph.D., Massachusetts Inst. of Technology. Adjunct Prof., City and Regional Planning.
WalkingStick, Kay, M.F.A., Pratt Institute. Prof., Art
Wanke, Val K., M.Arch., Harvard U. Assoc. Prof., Architecture
Warner, Mildred, Ph.D., Cornell U. Asst. 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
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 more than a dozen special fields within the Graduate School, as described in the Announcement of the Graduate School.

ORGANIZATION
Many different departments participate in the biology major.

Student services are provided by the Office of Undergraduate Biology (OUB), www.bio.cornell.edu. Located in Stimson Hall, the professional and student advisers provide academic and career advising, as well as help undergraduates find research opportunities on campus. Advisers in the OUB also follow the progress of biology majors and work closely with faculty advisers. Additional services and resources of the Biology Center include tutoring, lecture tapes, 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 and career advising for students interested in the marine sciences and administers the SEA Semester program for Cornell students pursuing studies at Woods Hole 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 Biological Sciences 109-110, 105-106, or 101 and 103 plus 102 and 104, or 107-108. For students in the College of Arts and Sciences, all biology (“BIO”) courses can be used toward fulfillment of the biological distribution requirement except BIO G 200 (unless permission is obtained), BIO G 209, or BIOMX 204. The following courses are especially suitable for the distribution requirement because they have no prerequisites: BIO G 101-104, 105-106, 107-108, 109-110, 170, 202, BIOAP 212, BIOEE 154, 277, 275, BIOLGD 184; BIOMI 192; BIONB 111; BIOPL 240, 241.

In the College of Human Ecology, the natural sciences distribution requirement is for at least 6 credits selected from BIO G 109-110, 101 and 103 plus 102 and 104, 105-106 or 107-108 or from specified courses in chemistry or physics.

Switching from one introductory biology sequence to another 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 BIO G 101-104.

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 are required to provide for the care of such animals as outlined in Guiding Principles in the Care and Use of Laboratory Animals (as approved by the Council of the American Physiological Society), the Guide for the Care and Use of Laboratory Animals (DHHS publication 86-23, revised 1996; see p. 16, 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 253-3520. 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, please see www.bio.cornell.edu/advising/ap.cfm.

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 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 adviser 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 1–9 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 only or if the student’s adviser grants permission.

1) Introductory biology for majors (one year): BIO G 101 and 103 plus 102 and 104, or 105–106. BIO G 107–108, offered during the eight-week Cornell Summer Session for 8 credits, also satisfies the introductory biology requirement for majors.

Students majoring in biological sciences may wish to consult with their biology adviser 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.
3) **College mathematics** (one year): Calculus (MATH 106, 111, 191, or their equivalent) plus one semester selected from the following:
   a. a second semester of calculus (MATH 112, 192, or their equivalents).
   b. a course in finite mathematics (Biometry 101, 417, MATH 105, 251).
   c. a course in statistics (BTRY 301, MATH 171, AEM 210, PSYCH 350, ILR 210, ECON 319, ECON 321, SOC 301).

4) **Organic chemistry**: CHEM 257 and 251, or 357-358 and 251, or 357-358 and 301, or 359-360 and 251, or 359-360 and 301.

5) **Physics**: PHYS 101–102, 207–208,* or 112–213.* Those who take PHYS 112–213 are advised to complete PHYS 214 as well.

6) **Genetics**: BIOGD 281.

7) **Biochemistry**: BIOBM 330, or 331 and 332, or 335.

8) **Evolutionary Biology**: BIOEE 278 or BIOEE 418. Note: BIOEE 241, Botany, is a prerequisite course to BIOEE 448.

9) A program of study selected from the outline below.

10) **Foreign language**: students registered in the College of Agriculture and Life Sciences must satisfy the foreign language requirement for the biology major by a) presenting evidence of successful completion of three or more years of study of a foreign language in high school or (b) successfully completing at least 6 college credits in a foreign language. Students registered in the College of Arts and Sciences must satisfy the language requirement as stated by that college.

   Although not required for the biological sciences major, a course in statistics is recommended for students planning graduate study or a research career. Students should consult their faculty advisers 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. Wherever they are found, the 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 in some Programs of Study can be met by participation in the independent research course (BIOG 495). The possible Programs of Study and their requirements are listed below:

1) **Animal Physiology**: BIOAP 311, Introductory Animal Physiology, BIOAP 316 Cellular Physiology, plus a minimum of 7 credit hours selected from the following lecture and laboratory courses, of which at least 4 credit hours must be a laboratory course.
   a) Lecture courses: BEE 454, Physiological Engineering; AN SC 300, Animal Reproduction and Development; AN SC 410, Nutritional Physiology and Metabolism; AN SC 427, Fundamentals of Endocrinology; BIO G 305, Basic Immunology; BIOAP 214, Biological Basis of Sex Differences; BIOAP 458, Mammalian Physiology; BIOBM 407, Nature of Sensing and Response; Signal Transduction in Biological Systems; BIOBM 437, Eukaryotic Cell Proliferation; BIOGD 365, Developmental Biology; BIOGD 463, Molecular Aspects of Development; BIOBM 322, Hormones and Behavior; BIOBM 325, Neurodiseases-Molecular Aspects; BIOBM 326, The Visual System, BIONB 492, Sensory Function, NS 331, Physiological and Biochemical Bases of Human Nutrition.

2) **Biochemistry**: CHEM 300, Quantitative Chemistry, six credits of organic chemistry (CHEM 357–358 or 359–360); a minimum of 4 credits of organic chemistry laboratory (CHEM 301–302 or 301–252); 4 credits of biochemistry laboratory courses (BIOBM 440, Laboratory in Biochemistry and Molecular Biology); and Physical Chemistry (CHEM 389–390 or 287–288 or 389–288).

   Note: CHEM 288 is designed for biologists.

   Five hours of Biochemistry are recommended (351 and 332, or 330 and 334 or 333 and 334) and students are urged to take BIOBM 432, Cell Biology, Students interested in graduate work in biochemistry PHYS 207–208 and consider taking a third semester of calculus in preparation for CHEM 389–390. Be sure to complete CHEM 207–208 or 215–216 during the freshman year.

   Note: Biology majors in the College of Agriculture and Life Sciences must also select this program of study to take up to 61 credit hours in the endowed colleges due to the high number of required endowed courses for this program of study.

3) **Computational Biology**: One course in computer programming (COM S 100, Introduction to Computer Programming, or BEE 151, Introduction to Computing); one course in mathematics (MATH 221, Linear Algebra and Calculus, or MATH 231, Linear Algebra; or MATH 294, Engineering Mathematics II; or MATH 420, Partial Differential Equations and Dynamical Systems; or BTRY 408, Theory of Probability; or BTRY 421, Matrix Computation); a bridging course, i.e., a course in mathematical modeling applied to biology (BIOEE 362, Dynamic Models in Biology; BIOEE 460, Theoretical Ecology; COM S/BIOEM 321, Numerical Methods in Computational Molecular Biology; or BTRY 382, Introduction to Statistical Genomics and Bioinformatics); and one course from the following list of advanced courses:


   It is strongly recommended that students complete the Core physics requirement using the PHYS 207/208 option.

   It is strongly recommended that students complete the Core organic chemistry requirement using the CHEM 257/251 option and that the time saved be used to take either COM S 211 or a second mathematics course from the list above.

   Note: MATH 112, Calculus, should be used to fulfill the core requirement for a second term of math.

   Note: Bridging courses require linear algebra (MATH 221, Linear Algebra and Calculus, or MATH 231, Linear Algebra, or MATH 294, Engineering Mathematics II; or BTRY 421, Matrix Computation). For bridging courses, BIOEE 460, Theoretical Ecology, MATH 420, Partial Differential Equations and Dynamical Systems, will also serve as a prerequisite.

   Note: BTRY 408 and MATH 420 can satisfy either the mathematics requirement or a requirement for an additional course.

   Note: Students who use BTRY 408 to fulfill the additional mathematics requirement
Note: Students are encouraged to gain experience in some aspect of field biology through course work at a biological field station.

Note: Students may apply up to 6 credits of 300-level courses taken at the Sholes Marine Laboratory (see BIOBM) toward the 10 credits. The Ecology and Evolutionary Biology Program of study offers a specialization in Marine Biology and Oceanography (for a description, see section entitled Courses in Marine Science).

Note: Alternatively, the Organization for Tropical Studies (OTS) offers an Undergraduate Semester Abroad Program, featuring two courses in biology (Fundamentals of Tropical Biology and Field Research in Tropical Biology). Students may substitute credit earned for these two courses for two 3-credit courses at the 400 level from list b. Information about the OTS Program is available at Cornell Abroad, 474 Uris Hall.

5) General Biology: The Program of Study in General Biology requires a minimum of 13 credit hours in addition to courses counted toward requirements 1-8 on page 152. These 13 credits must include:

a) One course from each of three different programs of study in biology. Only those courses specifically listed as fulfilling a program of study requirement are acceptable without permission of adviser.

b) A course with a laboratory.

c) And, a minimum of two upper-level (300 and above) courses of 2 or more credits each.

100-level courses are not acceptable for meeting any of these requirements. BIO G 498 may not be used to fulfill the requirements of this program of study. BIO G 499 (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 adviser, 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 413, 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 15 credits, usually chosen from the following courses: BIOGD 385, Developmental Biology; BIOGD 450, Vertebrate Development; BIOGD 480, Seminar in Developmental Biology; BIOGD 481, Population Genetics; BIOGD 482, Human Genetics and Society; BIOGD 493, Advanced Developmental Biology; BIOGD 484, Molecular Evolution; BIOGD 486, Advanced Eukaryotic Genetics; BIOGD 487, Human Genomics; BIOGD 489, Mammalian Embryology; BIOGD 600, Development of Sensory Systems; BIOGD 662, Fertilization and the Early Embryo; BIOGD 684, Advanced Topics in Population Genetics; BIOGD 687, Developmental Genetics; BIOGD 689, Cellular Basis of Development; BIOM 420, Microbial Genomics; BIOM 485, Bacterial Genetics; ENTOM 400, Insect Development; BIOM 475, Mechanisms Underlying Mammalian Developmental Defects; BIOM 495, Developmental Neurobiology; BIOM 497, Molecular and Genetic Approaches to Neuroscience; BIOM 499, Molecular and Genetic Approaches to Neuroscience; BIOM 537, Eukaryotic Cell Proliferation; BIOM 549, Molecular Basis of Human Disease; NSW 698, Epigenetics; BIOM 633, Biosynthesis of Macromolecules; BIOM 639, The Nucleus; BIOEE 453, Speciation; PL BR 403, Genetic Improvement of Crop Plants; PL BR 606, Advanced Plant Genetics; BIOPL 454, Molecular Biology and Genetic Engineering of Plants; BIOPL 541, Laboratory in Plant Molecular Biology; BIOPL 544, Regulatory Factors in Plant Growth and Development; BIOL 652, Plant Molecular Biology I; BIOL 655, Plant Molecular Biology II. Up to 3 credits for this Program of Study may be chosen from other Biological Sciences courses, including BIO G 499, Independent Research in Biology, with approval from the faculty adviser.

7) Insect Biology: ENTOM 212, 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).

(a) ENTOM 322, Insect Morphology; ENTOM 331, Introductory Insect Systematics; ENTOM 483, Insect Physiology.

(b) ENTOM 215, Spider Biology; ENTOM 325, Insect Behavior; ENTOM 333, Larval Insect Biology; ENTOM 352, Medical and Veterinary Entomology; ENTOM 370, Pesticides, Environment and Human Health; ENTOM 394, Circadian Rhythms; ENTOM 400, Insect Development; ENTOM 443, Entomology and Pathology of Trees and Shrubs; ENTOM 444, Integrated Pest Management; ENTOM 452, Herbivores and Plants; ENTOM 453, Historical Biogeography; ENTOM 455, Insect Ecology; ENTOM 456, Stream Ecology; ENTOM 463, Invertebrate Pathology; ENTOM 470, Ecological Genetics; ENTOM 471, Freshwater Invertebrate Biology and Bimuritorontology; ENTOM 477, Biological Control; ENTOM 490, Insect Toxicology; ENTOM 644, Advanced IPM.

8) Microbiology: Students in the Microbiology Program of Study must complete BIOM 290, General Microbiology, Lectures; BIOM 291, General Microbiology, Laboratory. At least 8 additional credits are required, which must include at least one of the following courses: BIOM 314, Bacterial Diversity; BIOM 416, Bacterial Physiology; BIOM 418, Microbial Ecology; BIOM 485, Bacterial Genetics.

Additional approved courses are included in the list below. Students are invited to complete their requirements in one of three areas of interest (these are only recommended, and students can design their own course list as long as they meet the requirements described above): (i) Prokaryotic Biology; (ii) Molecular Microbiology and Biotechnology; and (iii) Pathogenic Microbiology. Courses acceptable to the program of study that cover topics related to a particular area of interest are:

Prokaryotic Biology: BIOM 391, Advanced Microbiology Laboratory; BIOM 414, Bacterial Diversity; BIOM 416, Bacterial Physiology; and BIOM 418, Microbial Ecology.

Molecular Microbiology and Biotechnology: BIOM 391, Advanced Microbiology Laboratory; BIOM 416, Bacterial Physiology; BIOM 420, Microbial Genomics; BIOM 485, Bacterial Genetics; and BIOM 394, Applied and Food Microbiology.

Pathogenic Microbiology: BIOM 404, Pathogenic Bacteriology and Mycology; BIOM 409, Viruses and Disease; BIOM 417, Medical Parasitology; and BIOM 485, Bacterial Genetics.

9) Molecular and Cell Biology: Chemistry 357-358 or 359-360; BIOM 432, Survey
of Cell Biology; BIOBM 440, Laboratory in Biochemistry and Molecular Biology; and at least 7 additional credits of courses that have a cell biological or molecular biological orientation. The 7 additional hours should include at least two courses from the following list: BIOAP 416, Cellular Physiology and Genomics Laboratory; BIOBM 433, Laboratory in Cell Biology; BIOBM 434, Applications of Molecular Biology; BIOBM 435, Eukaryotic Cell Proliferation; BIOBM 439, Molecular Basis of Human Disease; BIO G 505, Immunology; BIOGD 385, Developmental Biology; BIOGD 483, Advanced Invertebrate Biology; BIOGD 484, Molecular Evolution; BIOGD 486, Advanced Eukaryotic Genetics; BIOMI 290, General Microbiology, Lectures; BIOMI 408, Viruses and Disease II; BIOMI 420, Microbial Genomics; BIOMI 485, Bacterial Genetics; BIOMN 222, Neurobiology and Behavior II: Introduction to Neurobiology; BIOMN 425, Molecular and Genetic Approaches to Neurosciences; BIOP 343, Molecular Biology and Genetic Engineering of Plants; BIOP 547, Laboratory Biology and Genetic Engineering of Plants; BIOP 444, Plant Cell Biology. Graduate-level courses such as BIOMI 631, Protein Structure and Function; BIOMI 635, Biosynthesis of Macromolecules; BIOMI 636, Cell Biology; and BIOMI 639, The Nucleus are also acceptable with permission of the adviser. Five hours of biochemistry are recommended (BIOM 351 and 352, or 330 and 334, or 333 and 334). CHEM 207-208 or 215-216 should be completed in the freshman year.

10) Neurobiology and Behavior: The two-semester introductory course sequence, Neurobiology and Behavior I and II (BION 221 and 222) with discussion sections in the fall and spring terms, includes an additional 7 credits. The 7 additional credits must include at least one ADVANCED course from the BION 221 offerings. "Topics" courses (BION 320s and 720s) and independent study (BIO G 499) may not count as ADVANCED courses.

Note: Students who declare the Program of Study in Neurobiology and Behavior after taking BION 221 or 222 for only 3 credits must take the 1-credit discussion section in BION 221 and 222. To arrange this, the student should consult the professors in charge of the two courses.

11) Nutrition: NS 331, 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 222, Maternal and Child Nutrition, NS 315, Obesity and the Regulation of Body Weight, NS 332, Methods in Nutritional Sciences; NS 347, Human Growth and Development; NS 361, Biology of Normal and Abnormal Behavior; NS 421, Nutrition and Exercise; NS 431, Mineral Nutrition and Chronic Disease; NS 441, Nutrition and Disease; NS 452, Molecular Epidemiology; and Dietary Markers of Chronic Diseases; NS 455, Nobel Prizes in Biomedical Research; NS 475, Mechanisms Underlying Mammalian Developmental Defects, NS 601, Proteins and Amino Acids; NS 602, Lipids; NS 603, Mineral Nutrition: Metabolic, Health, and Environmental Implications; NS 614, The Vitamins; and NS 614, Topics in Maternal and Child Nutrition. Some courses require NS 115, Nutrition Health and Society, which may be used as part of the additional nine credits. Independent study credits cannot be used toward the 13-credit minimum.

Note: For students in the College of Agriculture and Life Sciences, credits in NS courses count towards the required 55 CALS credits. For students in the College of Arts and Sciences, NS credits will be granted based on 100 hours required in A&S if those credits fulfill major requirements.

12) Plant Biology: Students choose one area of study from the following two options:

Option (a) Botany: Students are required to take Introductory Botany (BIOP 241). Students should then choose, with the aid of their faculty adviser, a minimum of three of the following courses, for a total of at least 10 additional credits, to round out their botanical training: BIOP 242 and 244, Plant Function and Growth, Lectures and Laboratory; BIOP 243, Taxonomy of Vascular Plants; BIOP 247, Ethnobotany, BIOP 248, Taxonomy of Vascular Plants: BIOP 342 and 344, Plant Physiology, Lectures and Laboratory; BIOP 343 and 347, Molecular Biology and Genetic Engineering of Plants, Lectures and Laboratory; BIOP 340, Methods in Biological and Biochemical Prospecting; BIOP 345, Plant Anatomy; BIOP 348, The Healing Forest; BIOP 359, Biology of Grasses; BIOP 404, Crop Evolution, Domestication, and Diversity; BIOP 422, Plant Development; BIOP 442, Current Topics in Ethnobotany; BIOP 444, Plant Cell Biology; BIOP 447, Molecular Systematics: BIOP 448, Plant Evolution and the Fossil Record; BIOP 449, Green Signals and Triggers—Tissue Culture; or PL BR 402, Plant Tissue Culture Laboratory.

Note: Students interested in beginning research independent study may petition the Biological Sciences Curriculum Committee for approval of the adviser, 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.


b) BIOP 453, Speciation; BIOP 464, Macroevolution, BIOP 479, Paleobiology; BIOP 480, Phylogenetic Systematics; BIOP 487, Molecular Systematics: BIOP 488, Plant Evolution and the Fossil Record; BIOP 493, Historical Biogeography; BIOP 442, Current Topics in Ethnobotany.

14) Independent Option: Students who want to undertake a course of study not covered by the existing programs of study may petition the Biological Sciences Curriculum Committee. Information on independent option and Curriculum Committee petition forms are available in the Office of Undergraduate Biology, 216 Stimson Hall.

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 with 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.bio.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 a research program. Students conducting research for the first time must enroll in BIO G 299, which is an S/U course designed to introduce students to research. After the first semester, students enroll in BIO G 499. Registration for both of these courses 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 receive research credit done off campus, unless supervised by a Cornell faculty member. Up to 3 credits of research may be used to complete the program of studies 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 laboratory or field research through the performance of an original research project under the direct guidance of a member of the Cornell faculty. Applications for the honors program are available in the Office of Undergraduate Biology, 216 Stimson Hall, and must be submitted in October of the senior year to the Honors Program Committee by the announced deadline. To qualify for the program, students must have been accepted into the biological sciences major, have completed at least 30 credits at Cornell, and have a cumulative Cornell grade-point average of at least 3.6. In addition, students must have at least a 3.0 cumulative Cornell grade-point average in all biology, chemistry, mathematics, and physics courses. (Grades earned in courses in other departments that are used to fulfill biology major requirements are included in this computation.) In addition, candidates must find a Cornell faculty member to supervise their research. An honors candidate usually enrolls for credit in BIO G 499. Undergraduate in Biology, section of this catalog.

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 on the web at www.bio.cornell.edu.

CURRICULUM COMMITTEE

Many decisions pertaining to the curriculum and to the programs of study are made by the Biology Committee. 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 advisers or come to 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 multidisciplinary program Biology and Society should see "Special Programs and Interdisciplinary Studies" in the College of Arts and Sciences section of this catalog.

GENERAL COURSES (BIO G)

Three introductory biology course sequences are taught during the academic year: BIO G 101-104, BIO G 105-106, and BIO G 109-110; and one during the eight-week summer session: BIO G 107-108. BIO G 101-104, 105-106, and 107-108 are intended for biological sciences majors and other students needing 8 credits from an introductory sequence for majors (for example, students in a premedical curriculum). Any of these sequences meet the prerequisite for 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).

BIO G 101-102 Biological Sciences, Lectures

101, Fall, 102, Spring, 2 credits each term. Prerequisite: concurrent enrollment in BIO G 103 (fall) or 104 (spring). Passing grade (D or better) in 101 is prerequisite to 102 unless permission is obtained from instructor. Lec, T 9:05; additional 2 lecs each week and a weekly lec for disc, M W F 1:30; rec, M W F 10:30. S-U grades optional, with permission of instructor. Lab, T R 10:20-11:10. 4 credits each term.

Designed primarily for biology majors, preprofessionals, and other students who desire a challenging, broad introduction to fundamental concepts of biology. Cell biology, physiology, anatomy (accompanied by preserved vertebrate dissection), and biochemistry are strongly emphasized in the fall semester. Subjects in the spring semester are genetics, development, ecology, and evolution, and morphology (accompanied by preserved vertebrate dissection). Students who plan to concentrate in anatomy and physiology 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. For those students who object to animal dissection, alternative materials are available for study. However, testing will involve identification of important structures in real organisms.

BIO 103-104 Biological Sciences, Laboratory

103, fall, 104, spring, 2 credits each term. Prerequisite: concurrent enrollment in BIO G 101 (fall) or 102 (spring). 103 is prerequisite to 104 unless permission is obtained from instructor. Students registered for laboratory courses who are more than 10 minutes late for the first meeting of the laboratory will forfeit their registration in that course. No admittance after second week of class. S-U grades optional, with permission of instructor. Lab, M T W or R 1:25-4:25, M or W 7:30-10:30 P.M., or T or R or S 8-11. One 3-hour lab each week and a weekly lec for disc, special lecs, etc. P. R. Ecklund and staff.

BIO G 103-104 is designed to provide laboratory experience with major biological phenomena to support an understanding of the important concepts, principles, and theories of modern biology. A secondary objective of the laboratory course 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 recording and data transformation techniques, and instrumentation in the major areas of biology. First-semester topics include biochemistry, physiology, plant biology, and behavior. In the second semester, laboratory experience is provided in the areas of genetics, biotechnology, invertebrate diversity, plant and animal development, and ecology. During the first semester, dissection of a doubly pithed frog is included. Dissection of several vertebrates occurs during the second semester. For those students who object to animal dissection, alternative materials are available for study. However, testing will involve identification of important structures in real organisms.

BIO G 105-106 Introductory Biology

105, fall, 106, spring, 4 credits each term (or 2 credits, with permission of instructor). Enrollment limited to 200 students. Taking 105-106 in sequence is preferred but not required. May not be taken for credit after BIO G 103-104 or 109-110. No admittance after first week of classes. S-U grades optional, with permission of instructor. Lec, T 9:05 (first lec of fall term, R 8/26, 9:05); additional study and lab. T. G. T. Adams. Designed primarily for biology majors, preprofessionals, and other students who desire a challenging, broad introduction to fundamental concepts of biology. Cell biology, physiology, anatomy (accompanied by preserved vertebrate dissection), and biochemistry are strongly emphasized in the fall semester. Subjects in the spring semester are genetics, development, ecology, evolution, and morphology (accompanied by preserved vertebrate dissection). 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 dissected specimens, students who object to dissection should not take BIO G 101–104. 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.

**BIO G 107–108 General Biology**
Summer (8-week session). 107, weeks 1–4; 108, weeks 5–8. 4 credits each. Prerequisite: one year of college or permission of instructor; BIO G 101, 103, 105, or 107 is a prerequisite for 108. Fee, $25 for weeks 1–4; $25 for weeks 5–8. Lecs. M–R 9–12, labs, M T R 1:30–4:30, F 9–12. Staff.

Designed for students who plan further study in biology and for students who want a broad course in biology as part of their general education. BIO G 107 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. BIO G 108 seeks to integrate the topics of genetics, developmental biology, population biology, and evolution, in a general consideration of biological evolution. The laboratory work is a continuation of the material covered in BIO G 107 and involves more techniques, a survey of animal organization, and the design and performance of a field study. BIO G 107–108 fulfills the introductory biology requirement for majors and forms a suitable introductory biology course sequence for students intending to go to medical school. For those students who object to animal dissection, alternative materials are available for study. However, testing will involve identification of important structures in real organisms.

**BIO G 109–110 Biological Principles**
Fall, 110; spring, 110. 3 credits each term. Limited to 600 students. Both BIO G 109 and 110, taken in either order, are required to fulfill the distribution requirement in the Colleges of Agriculture and Life Sciences and Human Ecology. Either course fulfills the College of Arts and Sciences distribution requirement; however, both are recommended since they constitute a survey. Students with transfer credit must consult with the course instructors for appropriate course placement. Due to overlap in content, BIO G 109 may not be taken after BIO G 102, or BIO G 103, or equivalent, and BIO G 110 may not be taken after BIO G 101, BIO G 105, or equivalent. BIO G 109–110 may not be used for introductory courses for majors in biological sciences or as introductory biology for premedical requirements. Note that this course satisfies the prerequisite for many but not all second-year courses in biology. Letter grade only. Students do not choose lab sections during course enrollment; lab assignments are made during the first day of classes. Evening prelims: fall, Sept. 23 and Nov. 2; spring, Feb. 24 and Apr. 7. Lecs, fall: T R 11:40, spring: M W F 9:05; lab meets alternate M T W R or F 2–4:25, or T 10:10–12:35 (spring), or W 7:30–10 P.M. D. Winkler, P. Davies, C. Eberhard, and staff.

Students who do not plan to major in biology may take this broad introductory course. The content is designed to appeal to anyone who seeks a comprehensive knowledge of biology as part of a general education. Broad goals of the course encompass an understanding of the potential benefits and limitations of science, the workings of the natural world, and the internal machinery of life—how our bodies and those of other animals and plants work. Fall semester covers biological diversity, genetics, evolution, ecology, behavior, and conservation biology; spring semester covers human physiology, plant development, genetic engineering, infectious diseases, and human health. Laboratory sections enable small groups of students to meet with course staff and to perform problem-solving experiments, demonstrations, and discussions. There are dissections of preserved vertebrate, invertebrate, and plant materials; for those students who object to dissection, alternative materials are available, and there is no grade penalty for omitting dissection or observation of animals. Testing, for students choosing to be tested on dissection labs, will involve identification of important structures in real organisms.

**BIO G 170 Evolution of the Earth and Life (also EAS 102)**
Spring. 3 credits. S–U grades optional. Lec. 01, T R 11:15–12:15; Lec. 02, T R 9:05–9:55; lab, T W or R 2–4:25; field trips during lab. J. L. Cass. For course description, see EAS 102.

**BIO G 200 Special Studies in Biology**
Fall, spring, or summer. 1–3 credits. Prerequisites: written permission from the Office of Undergraduate Biology. Students must register in 216 Stimson Hall. S–U grades optional, with permission of instructor. Hours TBA. Staff.

A registration device for students who want to take only one of the regular courses that is to be offered during the latter portion of the semester.

**BIO G 201 Seminar; Your Future in Biology at Cornell and Beyond**
Fall. 1 credit. Limited to 40 students. Prerequisite: one year of introductory biology. Sophomores and new junior transfer students only. S–U grades optional. Lec. 2 hours each week. J. Doyle and B. Comella.

A seminar course focusing on the academic and career interests of sophomore biology majors and new junior transfer students. Biology faculty, Office of Undergraduate Biology staff, biology alumni, and upperclass students will lead weekly sessions on diverse topics that may include the biology curriculum, bioethics, burgeoning fields and careers in biology, faculty and undergraduate research, biology in the post-9/11 era, and women in science.

**BIO G 202 The Diversity of Life**

The main focus of this course is on the diversity of living and extinct species. This diversity is examined from an evolutionary perspective, with attention to the principles employed in the discovery of species and in the analysis of relationships among them. Interactions between humans and other species are examined during the latter portion of the semester.

**BIO G 209 Introduction to Natural Science Illustration**
Summer (6-week session). 2 credits. Limited to 12 students. Prerequisite: freehand drawing or permission of instructor. S–U grades optional. Lecs and labs, T R 6:30–9:30 P.M. B. S. King.

An introduction to the art of natural science illustration for publication and to the techniques of various media including pencil, pen and ink, watercolor, colored pencil, scratchboard, and carbon dust. Potentials and limitations of line and half-tone reproduction, copyright, and portfolio presentation are discussed.

**BIO G 299 Introduction to Research Methods in Biology**
Fall, spring, or summer. Variable credit. Students must register for credit in the Office of Undergraduate Biology, 216 Stimson Hall. Applications are available in the OUB and on the web at www.bio.cornell.edu. The add deadline is three days before the university deadline. Any Cornell faculty member whose research field is biological in nature may serve as a supervisor for this course. Non-Cornell supervisors are not acceptable. S–U grades only. Recommended for freshmen and sophomores.

This course is intended for students who are not yet ready for undergraduate research. Students enrolled in BIO G 299 may be reading scientific literature, learning research techniques or assisting with ongoing research. Credit hours are variable (maximum of 3 credits is suggested) and grading is S–U only. The faculty supervisor will determine the work goals and the form of the final report.

**BIO G 305 Basic Immunology Lectures (also VETMI 315)**
Fall. 3 credits. Strongly recommended: basic courses in microbiology, biochemistry, and genetics. S–U grades optional, with permission of instructor. Lecs, T R 8:30–9:55. J. A. Marsh.

A survey of immunology, with emphasis on the biological functions of the immune response.

**BIO G 400 Undergraduate Seminar in Biology**
Fall or spring. Variable credit (1–3 credits assigned for individual seminar offerings). May be repeated for credit. S–U grades optional. Staff.

Specialized seminars on topics of interest to undergraduates presented by biology faculty including visiting faculty.
BIO G 401 Introduction to Scanning Electron Microscopy
Spring, weeks 1-8. 1 credit. Limited to 8 students. S-U grades optional. Fee may be charged. Lec, M 10:10; lab, T or R 9:05-12:15 or T W or R 12:25-4:25. Offered alternate years. M. V. Parthasarathy.
An introductory course that includes the principles and use of the transmission electron microscope. Students use biological material to explore and understand some of the fine biological architecture. In addition to preparing the specimens, students use the scanning electron microscope to study and obtain micrographs of features that interest them.

BIO G 403 Transmission Electron Microscopy for Biologists
Fall, 1, 3, or 4 credits (4 credits if student takes both sections). Limited to 8 students. Minimum of 4 students. Prerequisites: BIOAP 313, BIOPT 345 or 443, S-U grades optional. Two sections: Sec 01, 1 credit, weeks 1-4; sec 02, 3 credits, weeks 5-12. Students may register for one or both sections. Fee may be charged. Lec, T 11:15, lab, M W R T R 12:25-4:25. M. V. Parthasarathy.
Section 01. 1 credit, weeks 1-4, covers the principles and use of the transmission electron microscope (TEM), with emphasis on proper operation of the instrument and the interpretation of images obtained. Negatively stained materials are used for viewing with the transmission electron microscope. Section 02, 3 credits, weeks 5-12, covers the principles and techniques of preparing biological material for transmission electron microscopy. Using animal, plant, and microbe materials, this section studies chemical fixation, cryoultramicrosectioning, immunogold localization, quantitative microscopy, and metal shadowing techniques. Students have two additional weeks to complete laboratory assignments at the end of each section.

BIO G 404 Planning for Graduate Study in Biology
Fall, 3 credits. S-U only. TBA, L. E. Southard. This course will introduce students to the variety of careers available to students who plan on pursuing a graduate degree. The course will have two parts. The first sessions will provide general information on degrees available, selecting programs to apply to, the application process and funding. Students will also receive help with their personal statements.

During the second part of the class various speakers from Cornell and outside graduate schools will lead discussions about careers in their particular field, what the future looks like, and how to be a successful graduate student. Students are expected to participate in discussions and submit reflections after each session.

BIO G 408 Presentation Skills for Biologists
Spring. 1 credit. S-U only. Prerequisites: previous research experience. Preference given to students accepted into the Biology Honors Program. L. Southard and G. Hess. This course is designed to teach communication skills used in presenting research to other scientists. Topics covered include organization and writing of scientific papers, presentation tips for research seminars, and preparation of visual aids using Microsoft Power Point. All students present a 10-minute seminar on their research and evaluate other presentations.

BIO G 410 Teaching High School Biology
Fall. 3 credits. S-U grades optional. Prerequisite: one year introductory biology; permission of instructor. Alternate years beginning 2004. L. Southard.
This course provides students with the opportunity to experience teaching high school science. Students select an important biological concept, then develop inquiry-based teaching plans appropriate for high school students. The first part of the course consists of lectures, discussion, and laboratory experiments, which familiarize the students with the scientific content of the course. Students then work in teams with high school teachers to develop their presentations. The final part of the course includes practice presentations and teaching at regional high schools.

BIO G 431 Frontiers in Biophysics
Fall. 0.5 credit. S-U grades only. Lec TBA. G. Feigenson and staff. A day of lectures on Saturday, Sept. 18, 9:00-4:00, Racker Room, Biotechnology Bldg., giving an overview of current research in biophysics at Cornell by faculty from different departments at the university. Designed for undergraduates who are considering a career in biophysics and for graduate students who are interested in biophysics research opportunities at Cornell.

BIO G 450 Light and Video Microscopy for Biologists
Spring. 3 credits. Limited to 12 students. Prerequisites: one year of introductory biology and permission of instructor. Lecs, T R 12:25-3:20; lab, R 2:30-4:30. R. O. Wayne.
Theoretical and practical aspects of light microscopy, including brightfield, darkfield, phase-contrast, polarization, Hoffman-modulation contrast, interference, differential-interference contrast, and fluorescence microscopy, as well as video- and computer-based digital image enhancement, are studied. Students learn both qualitative and quantitative techniques to probe noninvasively the structure and function of living cells.

BIO G 498 Teaching Experience
Fall or spring. 1-4 credits. Enrollment limited. Prerequisites: previous enrollment in the course to be taught or equivalent. Arts students may not count this course toward graduation. They may, however, 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 grades optional, with permission of instructor. Staff.
Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or teaching. Biological sciences courses currently offering such experience include BIO G 105-106, BIOAP 311, 313, 319, BIOM 330, 351; BIOEE 274, 475; BIOGD 281; and BIOM 291, 292.

BIO G 499 Independent Undergraduate Research in Biology
Fall, spring, or summer. Variable credit. S-U or letter grade. Students in the Arts and Sciences College may register for more than 6 credits per term with one supervisor or 8 credits per term with more than one supervisor. Students in the College of Agriculture and Life Sciences may use up to 15 credits of independent study (BIO G 499, BIO G 497) toward graduation. Up to 3 credits of research may be used to complete the Programs of Study in General Biology, Genetics and Development, and Systematics and Biotic Diversity, and 4 credits of research in Neurobiology and Behavior. Prerequisite: 1 semester of BIO G 299 or equivalent. This course is for students continuing their Cornell research. Students enrolled for this credit should be doing independent work on their own project. The faculty supervisor will determine the form of the final report. Students must register for credit in the Office of Undergraduate Biology in 216 Simons Hall. Applications are available in the OUB and on the web at www.bio.cornell.edu. The add deadline is three days before the university deadline. Each student must submit a proposed research proposal description during course registration. Any Cornell faculty member whose research field is biological in nature may serve as a supervisor for this course. The faculty supervisor will determine the work goals and the form of the final report. Non-Cornell supervisors are not acceptable.

BIO G 504 Research Experience for Teachers (also EDUC 504 and PL BR 504)
Spring. 3 credits. S-U or letter. T. Fulton. For course description see EDUC 504.

BIO G 663 Nanobiotechnology (also A&EP 663)
Spring. 3 credits. Letter grade only. C. Batt. For course description see A&EP 663.

BIO G 705 Advanced Immunology Lectures (also VETMI 705)
Spring. 3 credits. Letter grade only. J. A. Marsh. Coverage of molecular and cellular immunology at an advanced level.

BIO G 706 Immunology of Infectious Diseases (also VETMI 719)
Spring. 2 credits. Prerequisite: BIO G 305 or permission of instructor. S-U grades optional, with permission of instructor. Lec, W 10:10-12:05. Offered odd alternate years. Coordinator: E. Donkers. This graduate-level course focuses on molecular and cellular mechanisms underlying immunity to infectious diseases caused by viral, bacterial, protozoan, and helminth pathogens. Topics include immune response initiation, antigen presentation pathways, Th1 and Th2 cytokines in protection and pathogenesis, mechanisms of cytotoxicity, immune evasion strategies, and vaccines. Lectures are based on recent advances in the field and are accompanied by relevant readings from the current literature.
ANIMAL PHYSIOLOGY (BIOAP)

[BIOAP 212 Human Physiology for Non-Biology Majors]

Spring. 3 credits. May not be taken for credit after BIOAP 311. Limited to 130 students. This course may be used toward the science distribution requirement of the College of Agriculture and Life Sciences and the Group B distribution requirement of the College of Agriculture and Life Sciences. This course may not be used to fulfill the requirements of any program of study in the biological sciences major. Lecs. M W F 1:25; disc. M W or F 2:15. Not offered 2005. M. D. Baustian.

Introduction to the principles of physiology governing the function of the human body. Emphasis is placed on reproduction, pregnancy and development, and immunology and the defense of the organism against disease. Major organ systems are surveyed to illustrate how physiologists study the function of living systems, and how this knowledge has shaped man’s management of health and disease. The contribution of information-based sciences of genetics, molecular biology, and the emerging biotechnologies to the study of human physiology is covered.

[BIOAP 214 Biological Basis of Sex Differences (also B&BSC 214 and B&BS 2141A)]


The structural and functional differences between the sexes are examined. Emphasis is placed on mechanisms of mammalian reproduction: where possible, special attention is given to studies of humans. Current evidence on the effects of gender on nonreproductive aspects of life (behavior, mental, and physical capabilities) is discussed. The 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 311 Introductory Animal Physiology, Lectures (also VETPH 346)]

Fall. 3 credits. Prerequisites: one year of college biology, chemistry, and mathematics. Recommended: previous or concurrent course in physics. S-U grades optional, with permission of instructor. Evening prelims. Lecs. M W F 11:15-12:05. A. Quaroni.

A 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 312 Farm Animal Behavior (also AN SC 305)]

Spring. 2 credits. Prerequisites: one year of introductory biology, and introductory animal physiology (AN SC 100 and 150 or equivalent, or BIOAP 311), except at least 1 animal production course or equivalent experience is recommended. S-U grades optional. Lecs. T R 11:15-12:00. P. Perry and K. A. Houpt.

The behavior of production species (avian and mammalian) influences the success of any management program. Students study behaviors relating to communication, learning, social interactions, reproduction, and feeding of domestic animals, and their physiological basis. Management systems for commercial livestock production and their implications for animal behavior and welfare are stressed.

[BIOAP 316 Cellular Physiology]

Spring. 3 credits. Prerequisite: concurrent or previous enrollment in BIOBM 330 or 331 and 332 or 333. Evening prelims. Lecs. M W F 11:15-12:05. 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 cellular activities. Among the main subtopics 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 319 Animal Physiology Experimentation]

Fall. 4 credits. Designed for upper-level undergraduate and graduate students studying in physiology, and other students interested in biomedically related professions. Graduate students in the Field of Physiology and related fields without equivalent background are strongly encouraged to enroll. Each of two afternoon laboratory sections is limited to 20 students. Prerequisite: concurrent or previous enrollment in BIOAP 311 or permission of instructor. Lecs. R 12:20; lab. M or W 12:20-5:00. E. R. Loew, N. A. Lorr, and staff.

A series of student-conducted in vitro and in vivo experiments designed to illustrate basic physiological processes in animals, with emphasis on relevance to humans, and to introduce students to physiological research techniques, instrumentation, experimentation, design, and interpretation of results. Techniques include anesthesia, surgical procedures, dissection under anesthesia, and real-time computer recording and analysis of data. Experiments with living tissues or live 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. Experimental resources include frogs, rats, rabbits, and sheep, which are not always euthanized after the laboratory exercises. Written reports of laboratory activities are required. Grading is based on evaluation of these reports, laboratory performance and weekly discussions, weekly quizzes, and a midterm and final exam.

[BIOAP 413 Histology: The Biology of the Tissues]

Spring. 4 credits. Prerequisite: one year of introductory biology. Recommended. BIOBM 330 or 331, or their equivalents. S-U grades optional, with permission of instructor. Lecs. M W 1:25; labs, M W 2:30-4:25. 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. Dynamic interrelations of structure of the cell and tissue levels. Dynamic interrelations of structure, composition, and function in cells and tissues are emphasized.

[BIOAP 416 Cell Physiology and Genomics Laboratory]

Spring. 4 credits. Limited to 24 students. Designed for graduate and upper-level undergraduate students with preference for Biology majors with a Physiology concentration. Prerequisite: concurrent or previous enrollment in BIOAP 316, Cell Physiology, or BIOAP 319, Survey of Cell Biology, or permission of instructor. Lecs. M W 12:20-1:30; labs. M W 1:25-4:25. A. Quaroni, N. A. Lorr, and staff.

A laboratory course to introduce students to modern methods and technologies in cell physiology and genomics. Laboratory exercises will teach the following experimental methods: 1) primary cell culture, cell cloning, subculturing, and cell counting; 2) cell and membrane imaging using fluorescence and electron microscopy; 3) karyotyping including chromosome spreading, banding, and fluorescent in situ hybridization; 4) flow cytometry and DNA electrophoresis for the assay of cell proliferation and cell death; 5) protein electrophoresis and Western blotting; 6) recombinant DNA technology including restriction analysis, cloning, transformation of competent cells, plasmid isolation, and transcription; 7) analysis of gene expression by use of RT-PCR, real-time PCR and microarray analysis; and 8) analysis of electrogenic transport systems in cultured epithelia mounted in Ussing chambers.

[BIO AP 425 Gamete Physiology and Fertilization (also AN SC 425)]

Fall. 2 credits. Limited to 50 students. Prerequisite: AN SC 300 or equivalent. Offered alternate years. Next offered fall 2005; not offered fall 2004, 2006. Lecs. R 2:30-4:25. J. E. Parks.

Study of the formation, growth, differentiation, and maturation of mammalian sperm and oocytes; gamete transport and interaction with male and female reproductive tracts; and cytological, physiological, and molecular changes required for fertilization. Lecture, discussion, and aspects of gamete physiology in vitro technologies such as cryopreservation, oocyte maturation, and fertilization are covered.

[BIOAP 427 Fundamentals of Endocrinology (also AN SC 427)]

Fall. 3 credits. Prerequisite: animal or human physiology or permission of instructor. Lecs. M W F 10:00. P. A. Johnson.

For description, see AN SC 427.

[BIOAP 458 Mammalian Physiology]

Spring. 3 credits. Enrollment limited. Graduate student auditors allowed. Prerequisite: BIOAP 311 or equivalent. Students not meeting this prerequisite must obtain written permission of instructor in TR 014 Vet Research Tower before the first class. Evening prelims. Lecs. M W F 10:10. K. W. Beyenbach.

The course offers an in-depth treatment of selected topics in mammalian and human physiology. Emphasis is on concepts and a working knowledge of physiology. Selected topics include basic functional elements of biological systems: recurrent themes in physiology, design of multicellular animals; mammalian fluid compartments; homeostasis; membrane and epithelial transport; electrophysiology; cardiovascular physiology; gastrointestinal physiology; renal physiology; and acid/base physiology. The lectures incorporate clinical correlations whenever appropriate. Occasional guest lecturers talk...
about work and careers in basic research or clinical medicine. Recommended for biological sciences majors, pre-med and pre-vet students, and beginning graduate students in physiology, nutrition, and animal science.

[BIOAP 475 Mechanisms Underlying Mammalian Developmental Defects [also NS 475]]
Spring. 3 credits. Prerequisites: BIOBM 330, 331-332, or 333 (may be taken concurrently). MWF 11:15. Offered alternate years. Next offered in spring 2006. D. M. Noden and P. Stover. Focus is on the causes of developmental defects and how genetic changes or teratogenic insults disrupt developmental regulatory and metabolic pathways.

[BIOAP 489 Mammalian Embryology (also BIOGD 489)]
Spring. 3 credits. Prerequisite: introductory biology. Lecs, T R 1-2:55; lab, T 2:30. Offered alternate years. Next offered in 2006. D. M. Noden. Examines the early formation of the mammalian body and placenta, emphasizing comparative aspects of normal and abnormal development. (Also NS 489.)

[BIOAP 619 Lipids (also NS 602)]
Fall. 2 credits. Lecs, T R 11:15-12:30. A. Bensadoun. Advanced course on biochemical, metabolic, and nutritional aspects of lipids. Emphasis is placed on critical analysis of current topics in lipid methodology, lipid absorption, lipoprotein secretion, molecular structure, and catabolism; molecular biology, function, and regulation of lipoprotein receptors; mechanisms of hormonal regulation of lipolysis and fatty acid synthesis; and cholesterol metabolism and atherosclerosis.

[BIOAP 710-718 Special Topics in Physiology]
Fall or spring. 1 or 2 credits for each topic. May be repeated for credit. Enrollment in each topic may be limited. S-U grades optional, with permission of instructor. Lectures, laboratories, discussions, and seminars on specialized topics.

[BIOAP 711 Readings in Applied Animal Behavior]
Fall. 1 credit. Prerequisite: BIOAP 311 or equivalent. Offered alternate years. Next offered in 2005-2006. 1 hour each week. K. A. Houpt.

[BIOAP 714 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. Emphasis is on nonlinear dynamics aspects of cardiac electrophysiology and cardiac arrhythmias.

[BIOAP 715 Stress Physiology: To Be Discussed as Part of Animal Welfare]
Fall. 1 credit. Prerequisite: BIOAP 311 or equivalent required. Offered alternate years. K. A. Houpt. The emphasis is on physiological assessment of stress.

[BIOAP 719 Graduate Research in Animal Physiology (also VETPM 628)]
Fall or spring. Variable credit. Prerequisites: written permission of the section chair and of the staff member who supervises the work and assigns the grade. S-U grades optional. Hours THA. Staff.

Similar to BIO G 499 but intended for graduate students who are working with faculty members on an individual basis.

[BIOAP 720 Animal Physiology and Anatomy Seminar]
Spring and fall. 1 credit each semester. Prerequisite: admission to the graduate Field of Physiology. This seminar course is designed to provide graduate students in the Field of Physiology with training to become professional scientists. Students who participate are required to give a seminar on their research. Advice and feedback are provided throughout the semester and in one special session devoted to a particular topic, advice is provided on subjects such as preparation of manuscripts, seminars, and grant proposals.

[BIOAP 757 Current Concepts in Reproductive Biology]
Fall. 3 credits. Limited to 20 students. Prerequisites: undergraduate degree in biology and a strong interest in reproductive biology. S-U grades optional. Lec/disc, T R 10:10-12:05. Offered alternate years. Not offered 2004. J. E. Fortune, W. R. Butler, and staff. A 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, and sperm physiology/function); female reproductive function (endocrinology, ovarian development and functions, oocyte physiology/function), fertilization and early embryo development; pregnancy, parturition; puberty; and reproductive technology. Student participation in the form of discussions and/or presentations.

Related Courses in Other Departments

Adaptations of Marine Organisms (BIOBM 413)
Advanced Work in Animal Parasitology (VETMI 737)
Animal Reproduction and Development (AN SC 300)
Developmental Biology (BIOGD 385)
Embryology (BIOGD 389)
Fundamentals of Endocrinology (AN SC 427)
Insect Morphology (ENTOM 522)
Integration and Coordination of Energy Metabolism (BIOBM 637 and NS 636)
Sensory Function (BIONB 492)
Teaching Experience (BIO G 498)
Undergraduate Research in Biology (BIO G 499)

BIOCHEMISTRY, MOLECULAR AND CELL BIOLOGY (BIOBM)

BIOBM 132 Orientation Lectures in Molecular Biology and Genetics (also BIOGD 132)
Spring, weeks 1-3. No credit. Primarily for freshmen, sophomores, and transfer students. S-U grades only. Lec, S 11:15, for first three S of semester (Jan 29, Feb 5, Feb. 12 in room 180 Biotechnology Building). Staff.

Discussions by six professors about their research and promising new areas for research in the future.

[BIOBM 233 Introduction to Biomolecular Structure (also CHEM 233)]
Fall. 2 credits. Limited to 30 students. Prerequisites: CHEM 207-208 or equivalents. Lecs, T R 2:30-3:50. S. E. Falcik. This course is intended for students with a basic understanding of chemistry who are considering a program of study in biochemistry. The interrelationship between the structure and function of biologically important molecules is explored.

[BIOBM 321 Numerical Methods in Computational Molecular Biology (see COM S 321)]
Fall. 3 credits. Prerequisites: at least 1 course in calculus, such as MATH 106, 111, or 151 and a course in linear algebra, such as MATH 221 or 294 or BTRY 417. No particular course in programming is required, but the student should have some familiarity with iteration, arrays, and procedures.

For course description see COM S 321.

BIOBM 330-332 Principles of Biochemistry

Introductory biochemistry is offered in three formats: individualized instruction (330) and lectures (331 and 332) during the academic year, and lectures (333) during the summer. Individualized instruction is offered to a maximum of 250 students each semester. Lectures are given fall semester (331), spring semester (332), and summer (333).

BIOBM 330 Principles of Biochemistry, Individualized Instruction

Fall or spring. 4 credits. Prerequisites: one year of introductory biology for majors and one year of general chemistry and CHEM 257 or 357-358 (CHEM 358 may be taken concurrently) or equivalent, or permission of instructor. Concurrent registration in BIOBM 334 is encouraged. May not be taken for credit after BIOBM 331, 332, or 333. S-U grades optional with permission of instructor. Evening prelims: fall, Sept. 30 and Nov. 2; spring, Feb. 24 and Apr. 15. J. D. 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 331 Principles of Biochemistry: Proteins and Metabolism

Fall. 3 credits. Prerequisites: one year of introductory biology for majors, one year of general chemistry, and CHEM 257 or 357-358 (CHEM 357 should not be taken concurrently) or equivalent, or permission of instructor. Concurrent enrollment in BIOBM 334 is encouraged. May not be taken for credit after BIOBM 330 or 333. S-U grades with permission of instructor. Evening prelims: Oct. 21. Lecs, M W F 10:10. G. W. Feigenson. The chemical reactions important to biology, and the enzymes that catalyze these reactions, are discussed in an integrated format. Topics include protein folding, enzyme catalysis, bioenergetics, and key reactions of synthesis and catabolism.
BIOBM 332 Principles of Biochemistry: Molecular Biology
Spring. 2 credits. Prerequisites: one year of introductory biology for majors and previous or concurrent registration in general chemistry, or permission of instructor. May not be taken for credit after BIOBM 330 or 333. S-U grades optional, with permission of instructor. Lects. T R 12:20. B. K. Tye.
A comprehensive course in molecular biology that covers the structure and function of proteins, enzyme catalysis, metabolism, and the replication and expression of genes. Topics include the structure and function of DNA, DNA replication repair, synthesis and processing of RNA and proteins, the regulation of gene expression, and the principles and uses of recombinant DNA technologies.

BIOBM 333 Principles of Biochemistry: Proteins, Metabolism, and Molecular Biology
Summer (6-week session). 4 credits. Prerequisites: one year of introductory biology or one year of general chemistry, and CHEM 257, or 357-358, or equivalents, or permission of the instructor. May not be taken for credit after BIOBM 330, 331, or 332. S. Ely or H. T. Nivison. Topics include the structure and function of proteins, enzyme catalysis, metabolism, and the replication and expression of genes.

BIOBM 334 Computer Graphics and Molecular Biology
Fall or spring. 1 credit. Prerequisite: concurrent registration in BIOBM 330. Students who have completed BIOBM 333 or 332 (BIOBM 332 may be taken concurrently) will also be permitted to register. 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 432 Survey of Cell Biology
Spring. 3 credits. Prerequisite: BIOBM 330, 333, or 331, and previous or concurrent registration in 332, or equivalent. Recommended: BIOGD 281. S-U grades optional for previous students only. Lects. M W 8:40-9:55. V. M. Vogt and W. J. Brown. A survey of a wide array of topics focusing on the general properties of eukaryotic cells. The 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 457, BIOGD 483; and BIOBM 632, 636, and 639.

BIOBM 433 Laboratory in Cell Biology
Spring. 1 credit. Prerequisites: concurrent enrollment in, or completion of, BIOBM 432, or equivalent. Two labs per week for the first seven weeks of the semester. T R 1:30-4:30. W. Brown. A laboratory course to introduce students to classic and modern methods in cell biology. The focus is on material not presented in the BIOBM 440 laboratory courses. Exercises include analysis of membrane protein and lipid composition, use of light, fluorescence, and electron microscopy, transfection of mammalian cells with CDNA expression vectors, live cell imaging of fluorescently labeled proteins using confocal microscopy, subcellular fractionation of organelles, and in vitro reconstitution of organelle assembly. Space is limited to 12 students. Preference given to biology majors concentrating in Molecular and Cell Biology.

BIOBM 434 Applications of Molecular Biology to Medicine, Agriculture, and Industry
Fall. 3 credits. Enrollment limited to 50 students. Prerequisites: BIOBM 330 or 333 or 331-332. Recommended: BIOGD 281. S-U grades optional. Lect. M W F 11:15-12:05. J. M. Calderwood. Lecture topics include large-scale sequencing of genomes, drug discovery based on genomics, combinational approaches to chemical libraries, pharmacogenetics, antibiotics derived from innate immune system, DNA and edible vaccines, transgenic animals, engineering plants resistant to insects, and gene therapy. About one-quarter of the course is devoted to exploring factors that are required for gene replication or altering ideas and to some social ramifications of biotechnology.

BIOBM 435-436 Undergraduate Biochemistry Seminar 435, fall; first meeting will be at 4 p.m. on Tuesday, August 31. 436, spring; first meeting will be at 4 p.m. on Tuesday, January 25, G71 Biotech Building. 1 credit each term. May be repeated for credit. Limited to upperclass students. Prerequisites: BIOBM 330, 333, or 331-332, or written permission of instructor. S-U grades only. Seminar time TBA. Organizational meeting first W of each semester. Selected papers from the literature on a given topic are evaluated critically during six or seven two-hour meetings.

BIOBM 437 Eukaryotic Cell Proliferation (also TOX 437)
Fall. Variable credits. Students may take lectures for 2 credits, or take both lectures and discussions for 3 credits. Enrollment for discussion section is limited to 20 students, with preference given to graduate students. Prerequisites: BIO 101-102 or BIOG 101-102 or BIO 105-106, and BIOBM 330 or BIOBM 331-332. Recommended: BIOGD 281 and BIOGD 432. S-U grades optional. Lect. T R 12:20-1:10. Disc. TBA. Not offered 2004-2005. S. Ely.
The course covers a wide spectrum of issues related to cell proliferation in eukaryotes. Lectures include various aspects of the regulation of cell division cycle and signal transduction pathways, with additional topics on oncogenesis, cell aging, and cell death. The facts as well as concepts and logics behind findings are presented in the lectures. Research articles are analyzed and discussed in depth during discussion section.

BIOBM 439 Molecular Basis of Human Disease (also BIOGD 439)
Fall. 3 credits. Prerequisites: biochemistry and molecular biology (e.g., BIOBM 330, BIOBM 331-332, or BIOBM 333) and genetics (e.g., BIOG 281) or permission of instructor. Recommended: cell biology (e.g., BIOBM 432 or BIOAP 310) and physiology (e.g., BIOAP 311 or BIOAP 450). S-U grades optional. Lects. T R 10:10-11:25. W. L. Kraus.
This course explores 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 the human immune deficiency syndromes, inborn errors of metabolism, gene fusions resulting in hybrid proteins, gene amplification, gene inactivation, disruption of signaling pathways, disruption of metabolic pathways, and the molecular actions of infectious agents and environmental toxins. Examples of diseases are selected to emphasize various aspects of genetics, molecular biology, cell biology, physiology, immunology, and endocrinology that have been presented in other courses. In addition, the methods used to identify the underlying biochemical and genetic basis of the diseases, as well as possible pharmaceutical and genetic therapies for treating the diseases, are presented. A portion of each class period will be devoted to discussion and practice questions.

BIOBM 440 Laboratory in Biochemistry and Molecular Biology
Fall, spring, or summer (3-week session). 4 credits. Enrollment limited. Preference is given to undergraduate biomedical students having Biochemistry or Molecular and Cell Biology Programs of Study and to graduate students with a minor in the Field of Biochemistry. Prerequisites: BIOBM 330 or 333 or 331-332 and one completed but one may be taken concurrently). Labs, M W 12:20-4:25 (disc, F 1:25) or T R 12:20-4:25 (disc, M 3:25). Summer (3-week session): M-F 10-5:30. S. Ely and H. Nivison. Experiments related to molecular biology (includes PCR, DNA cloning, 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 485 Bacterial Genetics (also BIOMI 485 and BIOGD 485)
Fall. 2 credits. Prerequisite: BIOGD 281. Recommended: BIOMI 250 and BIOBM 331 or 332 and 333. Lects. W 7:30-9:25 p.m. J. E. Peters. Participants in this course will gain a detailed understanding of how bacteria maintain and pass on genetic information with a strong focus on the bacterium Escherichia coli. Students will discover the processes by which bacteria evolve through different types of mutations and the exchange of genetic information. We will explore how genes are regulated efficiently through negative and positive regulation and by global regulatory mechanisms. Upon completion of the course students should understand the tools used to manipulate bacterial genomes for the understanding of bacteria and other living organisms.

BIOBM 631 Protein Structure and Function
Fall. 3 credits. Prerequisites: BIOBM 330 or 333 or 331-332 and organic chemistry. Recommended: physical chemistry. S-U grades optional. Lects. M W F 9:05. L. Nicholson. Presentations on the principles of protein structure and the nature of enzymatic catalysis. Specific topics include protein folding, stability, dynamics and evolution.
folded conformations and structure prediction, ligand binding energetics, and the structural basis of catalysis.

[BIOM 632] Membranes and Bioenergetics
Spring. 2 credits. Prerequisite: BIOM 330 or 333 or 331-32 or equivalent. Lecs. TR 11:15. Offered alternate years. P. C. Hinkle. Structure and dynamics of biological membranes, physical methods, model membranes, transport, ion-transport, ATPases, mitochondrial and chloroplast electron transfer chains, and examples of transport from plants, animals, and bacteria. Emphasis given to structure of membrane proteins.

[BIOM 633] Biosynthesis of Macromolecules

[BIOM 636] Advanced Cell Biology
Spring. 2 credits. Prerequisites: BIOM 330 or 333 or 331-32, or their equivalents. Lecs. TR 11:15-12:05. J. Fu. These courses provide an integrated view of eukaryotic cell organization as elucidated using biochemical, molecular, genetic, and cellular biological approaches. Major topics include the cytoskeleton, membrane traffic, and cell polarity. Together with BIOM 437, 632, and 639 this course provides broad coverage of the cell biology subject area.

[BIOM 638] Macromolecular Interactions and Cell Function
Spring. 2 credits. Prerequisite: BIOM 330 or 333 or 331–32. Recommended: BIOM 631 or 635. S–U grades optional. Lecs. TR 11:15–12:05. J. Fu. These lectures focus on the principles of protein-protein and protein-nucleic acid interactions that underlie cellular processes such as signal transduction, intracellular traffic, gene regulation, and cell development. The emphasis throughout this course is on the structural basis of these processes as related to cell function. Some specific topics covered are signal amplification, nuclear import and export, transcription by RNA polymerase II, RNA processing and export, and translation of mRNAs.

[BIOM 639] The Nucleus
Spring. 2 credits. Prerequisite: BIOM 330 or 333 or 331–32, or their equivalent. Recommended: BIOD 281. Lecs. TR 10:10. T. J. Liss. 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. This course covers the structure and function of the nucleus at the molecular and cell biological levels and, together with BIOM 437, 632 and 636, provides broad coverage of the cell biology subject area.

[BIOM 641] Laboratory in Plant Molecular Biology (also BIOL 641)
Fall. 4 credits. Prerequisites: BIOL 281 or equivalent. BIOM 330 or 331 or equivalent, and permission of instructor. S–U grades with permission of instructor.

Lab. T 9:05–4:30. J. B. Nasrallah, M. R. Hanson, and H. Wang. Selected experiments on gene expression, gene transfer, and reporter gene in plants. The course emphasizes the application of molecular biology methodology to plant systems. Additional lab time is required to complete assignments.

[BIOM 652] (Section 05) Molecular Biology of Plant Organelles (also BIOL 652.5)

[BIOM 653] (Section 04) Molecular Aspects of Plant Development I (also BIOL 653.4)
1 credit. Lecs. M W F 10:10 (12 lecs) Nov. 1–Dec. 3. J. B. Nasrallah. This module focuses on the molecular genetics of plant development. 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 differentiation of specialized cell types, and the control of developmental pathways by endogenous and external cues. The module is a companion to BIOL 652, Sec. 02 (Molecular Aspects of Plant Development I).

[BIOM 730] Protein NMR Spectroscopy (also VETPR 730)
Spring. 2 credits. Prerequisites: CHEM 389 and 390, or CHEM 287 and 288, or permission of instructor. S-U grades optional. Offered alternate years. Lecs. TBA. L. K. Nicholson and R. E. Oswald. The student acquires the tools necessary for in-depth understanding of macromolecules. This laboratory provides hands-on experience in the application of NMR spectroscopy to proteins for resonance assignment, structure determination, and dynamics characterization is studied.

[BIOM 732-737] Current Topics in Biochemistry
Fall or spring. 0.5 or 1 credit for each topic. May be repeated for credit. Prerequisite: BIOM 330 or 333 or 331–32 or equivalent. S–U grades only. Hours TBA. Lectures and seminars on specialized topics. Topics for fall and spring to be announced in the division's course supplement published at the beginning of each semester.

[BIOM 738] Macromolecular Crystallography (also CHEM 788)
Fall. 5 credits. Prerequisite: permission of instructor. Lecs. TR 10:10. Offered alternate years. S. E. Ealick. Lectures briefly cover the fundamentals of crystallography and focus on methods for determining the three-dimensional structures of macromolecules.

[BIOM 751] Ethical Issues and Professional Responsibilities
Spring. 1 credit. Limited to graduate students beyond first year. S–U grades only. Organizational meeting will be held on the first W of the semester. Sem. W. 3:35–4:25. Additional sections may be offered. 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.

[BIOM 761] Topics in Cancer Cell Biology (also VETMM 761)
Spring. Series of 1-credit graduate sections that reflect the cancer expertise of the Cornell faculty. (Course Director: B. U. Paul.) For description, see VETMM 761.

[BIOM 830] Biochemistry Seminar
Fall or spring. No credit. Sem. F 4:00. Staff. Lectures on current research in biochemistry, presented by distinguished visitors and Cornell faculty members. Lectures are open to everyone; but registration is limited to graduate students in Biochemistry, Molecular, and Cell Biology.

[BIOM 831] Advanced Biochemical Methods I
Fall. 6 credits. Required of, and limited to, first-year graduate students in the Field of Biochemistry, Molecular and Cell Biology. S–U grades only. Labs and discussions 12 hours each week TBA. Organizational meeting first R of semester 10:10. T. C. Huffer. 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 adviser.

[BIOM 832] Advanced Biochemical Methods II
Spring. 6 credits. Required of, and limited to, first-year graduate students in the Field of Biochemistry, Molecular and Cell Biology. S–U grades only. Lab TBA. T. C. Huffer. 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 adviser.

[BIOM 833] Research Seminar in Biochemistry
Fall or spring. 1 credit each term. May be repeated for credit. Required of, and limited to, second-, third-, and fourth-year graduate students majoring in the Field of Biochemistry, Molecular and Cell Biology. S–U grades only. Lab TBA. W. L. Kraus and V. M. Vogt. Each student presents one seminar per year on his or her thesis research and then meets with instructors and thesis committee members for evaluation.
BIOM 836 Methods and Logic in Biochemistry, Molecular and Cell Biology, Part I
Spring; credit. Limited to first-year graduate students majoring in the Field of Biochemistry, Molecular and Cell Biology. S/U grades only. Sem and disc TBA. G. P. Hesse
A seminar course with critical discussion by students of original research papers. A variety of topics in biochemistry, molecular and cell biology are covered.

BIOM 838 Methods and Logic in Biochemistry, Molecular and Cell Biology, Part II
Spring, 2 credits. Limited to second-year graduate students majoring in the Field of Biochemistry, Molecular and Cell Biology or the Field of Genetics and Development. S/U grades only. R 5:00-7:00. D. Shalloway
An 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, managing a research laboratory, etc. Exercises focus on the preparation of a mock research grant proposal.

Related Courses in Other Departments
Lipids (BIOAP 619 and NS 622)
Molecular Aspects of Development (BI OGD 483)
Molecular Biology Techniques for Animal Biologists (AN SC 650)
Molecular Mechanisms of Hormone Action (BIOAP 658 and VETMD 759)
Teaching Experience (BIO G 498)
Undergraduate Research in Biology (BIO G 499)

ECOLOGY AND EVOLUTIONARY BIOLOGY (BIOEE)

BIOEE 154 The Sea: An Introduction to Oceanography, Lectures (also EAS 154)
Spring. 3 credits. The optional 1-credit laboratory for this course is offered as BIOEE/EAS 155. S/U grades optional. Lecs, T R 11:00-12:55. C. H. Greene and W. M. White.
See EAS 154 for full course description.

BIOEE 155 The Sea: An Introduction to Oceanography, Laboratory (also EAS 155)
Spring. 1 credit. Prerequisite: concurrent enrollment in BIOEE/EAS 154. S/U grades optional. Lab, M 2:00-4:25 or 7:30-9:55 P.M., or W 7:30-9:55 P.M. C. H. Greene.
See EAS 155 for full course description.

BIOEE 207 Evolution (also HIST 287 and S&T 287)
Fall or summer. 3 credits. Intended for students with no background in college biology. May not be taken for credit after BIOEE 278. Does not meet the evolutionary biology requirement for the biological sciences major. S/U grades optional. Fall, Lecs, T R 10:10, disc, 1 hour each week TBA. Summer (6-week session): Lecs and disc, M W 6:00-9:00 P.M. A. MacNeill.
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 populations to the conflict between creationists and evolutionists.

BIOEE 261 Ecology and the Environment
Fall or summer. 4 credits. Prerequisite: one year of introductory biology, S/U grades optional. Lecs, M W F 11:15; disc, W or R 1:25, 2:30, or 3:35. A. S. Flecker and J. P. Sparks.
We explore the interactions between the environment and organisms as individuals, populations, communities, and ecosystems. The emphasis is on basic ecological principles and processes that are generally useful in 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 function, biodiversity, biogeochemistry, and productivity. Human influences on ecosystems, human-created ecosystems (agricultural and natural), and sustainable practices are covered.

BIOEE 263 Field Ecology
Fall. 3 credits. Limited to 25 students. Prerequisite: concurrent or previous enrollment in BIOEE 261. Lec, R 1:25; lab, F 12:20-4:25; 1 weekend field trip to the Hudson Valley. P. L. Marks.
Field exercises designed to give students direct experience with fieldwork, with emphasis on developing observational skills, journal keeping, and a landscape perspective. Topics include plant succession, niche interactions of insects, influence of herbivores and competition on plant performance, decomposition of soil litter, foraging behavior, census methods, and use of scientific collections.

BIOEE 264 Tropical Field Ornithology
Winter, January 6-20, 2005. 3 credits.
Limited to 12 students. Minimum of 8 students. Prerequisites: permission of instructor required. Intended for students with limited or no bird knowledge. S/U grades optional. Two week, full-time course. Daily field work, disc, reading, and an individual project. The cost of tuition covers airfare, food, and lodging. A. A. Dhondt and I. J. Lovette.
This course, given during the winter session, provides students with the opportunity to study birds intensively in a neotropical environment. Students will learn observational and field techniques, participate in group research projects and in daily seminars. The group is housed in the University Center at Punta Cana. One or two field trips will be organized to national parks in the Dominican Republic.

BIOEE 265 Introduction to Conservation Biology
Fall. 3 credits. Not be offered for credit after NTRES 450. Intended for both science and non-science majors. Completion of BIOEE 267 is not required for NTRES 450. S/U grades optional. Lecs, M W 9:05, disc, F 9:05 or R 2:30; 1 Saturday field trip. Offered alternate years. Not offered 2004-2005. J. P. Fitzpatrick.
An exploration of biological concepts related to conserving the earth's biodiversity, introducing ecological and evolutionary principles important for understanding major conservation problems. Topics include patterns of species and ecosystem diversity, causes of extinction, evolutionary theories of animal and plant species, population genetics, and ways to protect endangered species, aquatic and terrestrial ecosystems, and the value of biodiversity.

BIOEE 274 The Vertebrates: Structure, Function, and Evolution
An 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. Laboratory includes dissections of preserved vertebrate animals and noninvasive live animal demonstrations.

BIOEE 275 Human Biology and Evolution (also ANTHR 275 and NS 275)
Fall. 3 credits. S/U grades optional, with permission of either instructor. Lecs, M W F 10:10; disc, M 10:10 or TBA. Lects every W and F; occasional lectures on M. Not offered 2004-2005. K. A. R. Kennedy and J. D. Haas.
An introduction to the biology of Homo sapiens through an examination of human evolution, biological diversity, and modes of adaptation to past and present environments. Evolutionary theory is reviewed in relation to the current evidence from the fossil record and studies of the evolution of human behavior. A survey of human adaptation covers a complex of biological and behavioral responses to environmental stress. Human diversity is examined as the product of long-term evolutionary forces and short-term adaptive responses. Topics such as creationism, the Piltdown fraud, the sociobiology debate, genetic engineering, race and IQ, and racism are presented as examples of current issues in human biology.

BIOEE 278 Evolutionary Biology
Fall or spring, 3 or 4 credits. (4-credit option involves writing component and two discussion sections per week; limited to 20 students per section each semester. Students may not preregister for the 4-credit option, interested students complete an application form on the first day of class.) Limited to 300 students. Prerequisite: 1 year of introductory biology or permission of instructor. First-semester freshmen must have permission of instructor. S/U grades optional. Evening prelims: spring, Mar. 3 and Apr. 5; Lecs, T R 9:05; disc, 1 hour each week TBA. Fall, I. J. Lovette; spring, M. J. Shulman.
The course considers explanations for patterns of diversity and for the apparent "good fit" of organisms to the environment. Topics covered include the genetic and developmental basis of evolutionary change, processes at the population level, the theory of 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.
ECOLOGY AND EVOLUTIONARY BIOLOGY

[BIOEE 350] Dynamics of Marine Ecosystems (also EAS 350)
Fall. 3 credits. Limited to 25 students. Prerequisite: one year of calculus and a semester of oceanography (e.g., BIOEE/EAS 154), or instructor's permission. S-U grades optional. Lect, T R 1:25-2:40. Offered alternate years. Not offered 2004-2005. E. H. Greene and R. W. Howarth. See EAS 350 for full course description.

[BIOEE 362] Dynamic Models in Biology (also MATH 362)
Spring. 3 credits. Prerequisites: two semesters of introductory biology (BOG-G 101-102, 105-106, 107-108, 109-110 or equivalent) and completion of the mathematics requirements for the Biological Sciences major or equivalent. S-U grades optional. Lecs, M W F 10:10-11:00. Some class meetings (during the regular lecture time) will be in computer lab. Offered alternate years. Not offered 2004-2005. S. P. Ellner and J. M. Guckenheimer.

Introductory survey of the development, computer implementation, and applications of dynamic models in biology and ecology. Case-study format, covering a broad range of current application areas such as regulatory networks, neurobiology, cardiology, infectious disease management, and conservation of endangered species. Students also learn how to construct and study biological systems models on the computer using a scripting and graphics environment.

[BIOEE 373] Biology of the Marine Invertebrates
Fall (but course must be taken in the previous summer at the Shoals Marine Laboratory). 5 credits. Limited to 24 students. Prerequisite: one year of introductory biology for majors. Permission of faculty required because it is off campus. Students in BIOEE 373 are strongly encouraged to take BIOEE 477. Three-week, full-time course. Daily and evening lectures, laboratories, and fieldwork. Course is taken during the summer; enroll for credit during the subsequent fall semester. Total cost for room, board, and overhead at SML: $1,200. Offered alternate years. Not offered 2004-2005. C. D. Harvell and J. G. Morin.

An introduction to the biology and evolution of the major invertebrate phyla, concentrating on marine representatives. In addition to the evolution of form and function, lectures cover aspects of ecology, behavior, physiology, chemical ecology, and natural history of invertebrates. The Shoals Marine Laboratory exposes students to a wealth of marine and terrestrial invertebrates in their natural habitats. Regular field excursions allow an excellent opportunity to study freshly collected and in situ representatives of most of the major phyla.

[BIOEE 405] Biology of the Neotropics
Spring. 2 credits. Limited to 18 students. Prerequisite: BIOEE 261 or permission of instructor. S-U grades optional. Lec and disc, W 7:30-9:30 p.m. P. H. Wrege and A. S. Fischer.

This course is an introductory survey of the biology of the New World tropics, with primary focus on moist lowland forests. The objectives are to learn basic characteristics and phenomena important to understanding neotropical biology, to gain firsthand knowledge of the resources in tropical biology available at Cornell, and to learn how to organize and execute a meaningful seminar presentation.

[BIOEE 452] Herbivores and Plants: Chemical Ecology and Coevolution (also ENTOM 452)
Spring. 3 credits. Prerequisites: one year of introductory biology, BIOEE 261, CHEM 257 or 357/358 and 251 or 301, or permission of instructor. S-U grades optional. Field and laboratory lectures, or laboratory demonstrations may be held in place of F lecture. Lecs, M W F 11:15. Offered alternate years. P. P. Feeny.

Topics include significance of plant chemistry in mediating interactions between plants and herbivorous animals; mechanisms and strategies of plant finding and exploitation by animals, especially insects, and of defense and escape by plants; evolutionary hypotheses for ecological patterns of resistance and attack; and implications for human food and agriculture.

[BIOEE 453] Speciation
Spring. 3 credits. Limited to 40 students. Prerequisites: BIOE 278 and BIOG 281 or equivalents, or permission of instructor. S-U grades optional. Lecs, T R 10:10-11:25. Some class meetings (during the regular lecture time) will be in computer lab. Offered alternate years. R. G. Harrison.

An advanced course in evolutionary biology focusing on the pattern and process of speciation and origin of intrinsic barriers to gene exchange. Topics covered in lectures 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 will be on developing a rigorous conceptual framework for discussing speciation and on detailed analysis of a series of case histories.

[BIOEE 455] Insect Ecology (also ENTOM 455)
Fall. 3 credits. Prerequisites: BIOEE 261 or equivalent and ENTOM 212 or knowledge of another taxon. S-U grades optional. Lecs, M W F 11:15. Not offered 2004-2005. Staff.

Topics include the nature and consequences of biotic diversity, biogeography, coevolution, adaptive syndromes exhibited by various guilds, population regulation, impact of insects on ecosystems, comparative and functional analysis of communities, and differences in the organization of natural and managed systems. Ecological and evolutionary principles are integrated by thorough study of exemplars.

[BIOEE 456] Stream Ecology (also ENTOM 456 and NTRES 456)
Spring. 4 credits. Limited to 60 students. Prerequisites: completion of the Biological Sciences mathematics requirement or equivalent, and either one additional semester of mathematics, statistics, or modeling (e.g., BEE 260, BEE 411, NTRES 305, NTRES 460, EAS 350, EAS 456, or permission of instructor. S-U grades optional. Lecs, T R 12:50-2:20; lab, T W or R 12:50-2:25, 1 weekend field trip. Fee: $12 (for food on field trip). Offered alternate years. Not offered 2004-2005. Next offered spring 2006. N. G. Hairston, Jr. and staff.

Laboratory and field trips devoted to studies of the biological, chemical, and physical properties of lakes and other freshwater environments. Exercises focus on understanding the freshwater environment on experimentation, and on understanding ecological processes within lakes. Optional vertebrate dissection (fish) during one laboratory exercise and during a portion of the weekend field trip.

[BIOEE 460] Theoretical Ecology
Spring. 4 credits. Enrollment limited. Prerequisites: completion of the Biological Sciences mathematics requirement or equivalent, and either one additional semester of mathematics, statistics, or modeling (e.g., BEE 260, BEE 411, NTRES 305, NTRES 460, or permission of instructor. S-U grades optional. Lecs, T R 10:10-11:25. Offered alternate years. S. P. Ellner.

An 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 multispecies 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 462] Marine Ecology (also EAS 462)
Fall. 3 credits. Limited to 75 students. Prerequisite: BIOEE 261. Letter grade, S-U by permission only. Lecs and disc, M W F 11:15. Offered alternate years. C. D. Harvell and S. U. by D. W. Doss. 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, including polar seas, temperate coastal waters, and tropical coral reefs.

[BIOEE 463 Plant Ecology and Population Biology, Lectures]  
Fall, 3 credits. Prerequisite: BIOEE 261 or 278 or equivalents, or permission of instructor. Recommended: some taxonomic familiarity with vascular plants and concurrent enrollment in BIOEE 465. Lecs, M W F 11:15. Not offered 2004-2005. M. A. Geber and P. L. Marks.

This course examines the biological and historical factors affecting the structure of plant communities, and the distribution, abundance, and population dynamics of individual species. The influence of the environment, disturbance history, competition, and herbivory on the organization of plant communities are considered. Plant populations are also studied through an analysis of plant life histories and plant-plant and plant-animal interactions. Throughout the course an attempt is made to relate empirical patterns, experimental results, and theory. Readings are drawn from the primary literature.

[BIOEE 464 Macровolution]  
Spring, 4 credits. Limited to 25 students. Prerequisite: BIOEE 278 or permission of instructor. Grad students interested in taking this course are encouraged to meet with instructor to preorganize prerequisites in S-U grades optional, with permission of instructor. Lecs, T R 10:10-11:25; disc. 1 hour each week TBA. Offered alternate years. Not offered 2004–2005. A. R. McCune.

An advanced course in evolutionary history centered on large-scale features of evolution. Areas of emphasis include phylogeny, reconstruction, patterns and processes of speciation, the origin of variation, causes of major evolutionary transitions, and patterns of diversification and extinction in the fossil record. Discussion of these problems involves data and approaches from genetics, morphology, systematics, paleoecology, development, and ecology.

[BIOEE 465 Plant Ecology and Population Biology, Laboratory]  

Field and laboratory exercises are designed to give firsthand experience with the ecology and population biology of plants. Emphasis is on making observations and measurements of plants in the field and greenhouse, and on data analysis.

[BIOEE 466 Physiological Plant Ecology, Lectures]  
Spring, 3 credits. Limited to 30 students. Prerequisite: BIOEE 261 or introductory plant physiology. S-U grades optional, with permission of instructor. Lecs, M W F 10:10-11:00. Offered alternate years.

A detailed survey of the physiological approaches used to understand the relationships between plants and their environment. Lectures explore physiological adaptation; 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 physiological patterning, community, and ecosystem levels. Readings draw from the primary literature and textbooks.

[BIOEE 467 Seminar in the History of Biology (also HIST 415, B&SOC 447, and S&T 447)]  
Summer (6-week session). 4 credits. Limited to 18 students. S-U grades optional. W. B. Provine. Specific topic changes each year.

[BIOEE 468 Physiological Plant Ecology, Laboratory]  
Spring, 2 credits. Limited to 15 students. Prerequisite: previous or concurrent enrollment in BIOEE 466. Lab, M 1:25-4:25; plus additional lab hours TBA. Offered alternate years. J. P. Sparks.

A detailed survey of the physiological approaches used in understanding the relationships between plants and their environment. Labs, T R 10:10–11:25. Offered alternate years. H. W. Greene.

Field and laboratory exercises are based on primary literature and textbooks. Students in this course are strongly encouraged to bring a project to complete during the course. Readings are drawn from the primary literature.

[BIOEE 469 Food, Agriculture, and Society (also B&SOC 469 and S&TS 469)]  

A multidisciplinary course dealing with the social and environmental impact of food production in the United States and developing countries. Agroecosystems of various kinds are analyzed from biological, economic, and social perspectives. The impacts of traditional, conventional, and alternative agricultural techniques are critically examined in the context of developed and developing economies. Specific topics include pest management, soil conservation, plant genetic resources, biotechnology, and sustainable development.

[BIOEE 470 Herpetology, Lectures]  

Lectures cover various aspects of the biology of amphibians and reptiles, including evolution, zoogeography, ecology, behavior, and physiology.

[BIOEE 471 Mammalogy]  

Lectures on the evolution, classification, distribution, and adaptations of mammals. Laboratory and fieldwork on systematic, ecology, and natural history of mammals of the world, with primary emphasis on the North American fauna. Systematics laboratories held in the museum at Research Park. Live animals are studied in the field and are sometimes used in the laboratory for nondestructive demonstrations or experiments. The systematics laboratory exercises are based on museum specimens.

[BIOEE 472 Herpetology, Laboratory]  
Spring, 2 credits. Limited to 35 students. Prerequisite: consent of instructor. Required: concurrent or previous enrollment in BIOEE 470. S-U grades optional, with permission of instructor. Fee: $30. Labs, T R 1:25–4:25; occasional field trips and special projects. Offered alternate years. H. W. Greene.


Field and laboratory exercises are based on primary literature and textbooks. Students in this course are strongly encouraged to bring a project to complete during the course. Readings are drawn from the primary literature.

[BIOEE 473 Ecology of Agricultural Systems (also CSS 473)]  
Fall, 3 credits. Limited to 45 students. Prerequisite: BIOEE 261 or permission of instructor. S-U grades optional. During the first 6 weeks of class, Thursday meetings may run later because of field trips. Lecs and discs, T R 2:30–3:45. Not offered 2004–2005. A. G. Power and E. C. M. Fernandes.

Analysis of the ecological processes operating in agricultural systems, with an emphasis on the interactions between organisms. Topics include nutrient dynamics in agroecosystems, plant competition and facilitation, intercropping, the ecology of species invasions, mutualism in agroecosystems, plant-herbivore relations, plant-pathogen interactions, biological pest control, and evolutionary processes in agriculture. Case studies from both the tropics and the temperate zone are used to illustrate important exercises.

[BIOEE 475 Ornithology]  

Lectures cover various aspects of the biology of birds, including anatomy, physiology, systematics, evolution, behavior, ecology, and biogeography. Laboratory includes dissection of dead material, studies of skeletons and plumages, and specimen identification of avian families of the world and species of New York. Independent projects emphasize research skills.

[BIOEE 476 Biology of Fishes]  
Fall, 4 credits. Limited to 24 students. Prerequisite: BIOEE 274 or equivalent experience in vertebrate zoology. S-U grades optional, with permission of instructor. A small lab fee may be required. Lecs, M W F 10:10; lab, M 1:25–4:25; with additional lab time TBA. Offered alternate years. A. R. McCune.

An introduction to the study of fishes: their structure, evolution, distribution, ecology, 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.
physiology, behavior, classification, and identification, with emphasis on local species. 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 477 Marine Invertebrates Seminar] Fall. 1 credit. Prerequisite: BIOEE 373 or permission of instructor. S-U grades only. Sem, 1 hour each week TBA. Offered alternate years. Not offered 2004–2005. C. D. Harvell and J. G. Morin. Discussions and directed readings center on current research themes in Invertebrate Biology. Designed as an on-campus companion course to the field-based BIOEE 373, Biology of the Marine Invertebrates. Students will write individual research essays based on projects done in the field.

[BIOEE 478 Ecosystem Biology] Spring. 4 credits. Prerequisite: BIOEE 261 or equivalent. S-U grades optional. Lecs and disc, T R 10:10–12:05. Offered alternate years. C. L. Goodale and R. W. Howarth. Analysis of ecosystems in terms of energy flow and nutrient cycles, emphasizing an experimental approach and comparative aspects of terrestrial, freshwater, and marine ecosystems. We consider anthropogenic effects on ecosystems, such as acid precipitation and nitrogen pollution. Also includes analysis of climate change and regional environmental change from an ecosystem perspective.

[BIOEE 479 Paleobiology (also EAS 479)] Fall. 4 credits. Prerequisites: one year of introductory biology for majors and either BIOEE 274, EAS 375, BIOEE 373, or permission of instructor. S-U grades optional. Lecs, T R 10:10–11:25, lab W 2:00–4:25. Offered alternate years. Not offered 2004–2005. W. Allmon. See EAS 479 for full course description.

[BIOEE 490 Topics in Marine Biology] Spring. 2 credits. May be repeated for credit. Primarily for undergraduates. Limited to 15 students. Prerequisite: permission of instructor. S-U grades optional. Lec, F 1:25–3:20. Offered alternate years. Not offered 2004–2005. J. G. Morin and M. J. Shulman. Seminar courses on selected topics in marine biology, may include laboratory or field trips. Topics and time of organizational meeting are shown in departmental course offerings listed on the web site.

[BIOEE 660 Field Studies in Ecology and Systematics] Fall or spring. Variable credit. Prerequisites: BIOEE 261, a taxon-oriented course, and permission of instructor. S-U grades optional, with permission of instructor. Lecs and field trips TBA. Estimated costs: TBA. Staff. This course 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.

[Section 01: Life Histories of Marine and Freshwater Invertebrates] Spring. 2 credits. Prerequisite: undergraduates must have previous experience or course work with marine or freshwater invertebrates. Extended field trips over winter break. Fee, TBA (to cover transportation and housing). Offered alternate years. Not offered 2004–2005. C. D. Harvell and N. G. Hairston, Jr. Field trips to the Yucatan Coast of Mexico. Students employ experimental approaches to study the ecology of invertebrate life histories.

[Section 02: Graduate Field Course in Ecology] Spring. 3 credits. Restricted to graduate students. A fee will be required to help cover food and lodging for trip to Florida. Offered alternate years. Not offered 2004–2005. J. P. Sparks. The course is designed to give graduate students experience in defining questions and designing field investigations. The class is based at the Archbold Biological Station in central Florida over spring break and during the following week. The class visits several ecosystems including sand pine scrub, cattle ranches, cypress swamps, everglades, and coral reefs.

[BIOEE 661 Environmental Policy (also ALS 661 and B&SOC 461)] Fall and spring. 3 credits each term. (Students must register for 6 credits each term, since an “R” grade is given at the end of the fall term.) Limited to 12 students. Prerequisite: permission of instructor. Sem, T R 2:30–4:30. D. Pinetmel. This course focuses on complex environmental issues. Ten to twelve 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 670 Graduate Seminar in Vertebrate Biology] Fall or spring. 1 credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades only. Sem TBA. Staff. Seminar presentations and discussions by students on areas of current research in vertebrate biology. Topics vary from semester to semester.

[BIOEE 671 Palaeoanthropology of South Asia (also ANTHR 671 and ASIAN 671)] Fall. 3 credits. Limited to 15 students. Lec, M 2:30–3:20; sem, W 7:30–9:30 P.M. K. A. Kennedy. The course explores recent developments in the prehistoric archaeology, palaeoecology, and biological anthropology of the ancient peoples of India, Pakistan, Sri Lanka, and the bordering countries. Issues of origin and decline of the Indus Civilization, fossil record of early humans in the Indian subcontinent, and current research topics are discussed.

[BIOEE 673 Human Evolution: Concepts, History, and Theory (also ANTHR 673)] Spring. 3 credits. Prerequisite: one year of introductory biology or ANTHR 101 or permission of instructor. Lec, M 2:30; sem, and disc, W 7:30–9:30 P.M. Offered alternate years. K. A. Kennedy. A survey of the historical background of present-day concepts of human evolutionary variations and adaptations in space and time. The formation of biological anthropology as a unique area of scientific inquiry within the social and biological sciences is reviewed. Students select their own topics within a broad range of readings in the history of Western concepts of human origins, diversity, and place in nature.

[BIOEE 754-760 Special Topics in Evolution and Ecology] Fall or spring. 1–3 credits. May be repeated for credit. Enrollment limited. S-U grades optional, with permission of instructor. Staff. Independent or group intensive study of special topics of current interest. Content varies each semester.

[BIOEE 761 Microsatellite DNA: Techniques] Fall. 1 credit. May be repeated for credit. Limited to 12 students. Prerequisite: Permission of instructor required. S-U grades only. Fee, TBA. Lec. and disc. TBA. R. G. Harrison and S. M. Bogdanowicz. 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.
BIOGD 280 Lectures in Genetics
Fall, spring, or summer (8-week session).
3 credits. Not open to freshmen in fall semester. Lecture component of BIOGD 281. Not to be taken by students majoring in Biological Sciences; this course may not be used to fulfill the requirements for the Biological Sciences major. Prerequisites: one year of introductory biology or equivalent, or permission of instructor. Lecs. T R 10:10–12:05. Problem-solving sessions strongly recommended. T or W 8:30–9:45 (additional session by arrangement). T. D. Fox and R. J. MacIntyre.
A general study of the fundamental principles of genetics in eukaryotes and prokaryotes. Discussions cover gene transmission, gene action and interaction, gene linkage, and recombination. gene and chromosome mutations, genes in populations, and extrachromosomal inheritance. Aspects of recombinant DNA technology are discussed.

BIOGD 281 Genetics
Fall, spring, or summer (8-week session).
5 credits. Not open to freshmen in fall semester. Prerequisite: one year of introductory biology or equivalent. Lecs. T R 10:10–12:05; lab. Problem-solving sessions strongly recommended. T or W 8:30–10:00 (additional session by arrangement). T. D. Fox and R. J. MacIntyre.
A general study of the fundamental principles of genetics in eukaryotes and prokaryotes. Discussions cover gene transmission, gene linkage and recombination, gene structure, gene and chromosome mutations, and gene action and regulation. Aspects of recombinant DNA technology are discussed.

BIOGD 282 Human Genetics
Spring. 2 or 3 credits (2 credits if taken after BIOGD 281). Prerequisite: 1 year of introductory biology or equivalent. S-U grades optional. Lees, M W F 11:15. K. Kemphues.

BIOGD 385 Developmental Biology
Fall. 3 credits. Prerequisite: BIOGD 281. Lecs. M W F 11:15. K. Kemphues.
An introduction to the morphogenetic, cellular, and genetic aspects of the developmental biology of animals.

BIOGD 394 Circadian Rhythms (also ENTOM 394, BIONB 394, PL PA 394)
Fall. 2 credits. Prerequisite: 200-level biology course. S-U grades optional. Lec. T 10:10–11:50. K. Lee (fall, even years) and J. Ewer (fall, odd years). For description, see ENTOM 394.

BIOGD 439 Molecular Basis of Human Disease (also BIOM 439)
Fall. 3 credits. Prerequisites: biochemistry and molecular biology (e.g., BIOM 330, BIOM 331/332, or BIOM 335) and genetics (e.g., BIOEE 281) or permission from instructor. Recommended: cell biology (e.g., BIOM 432 or BIOP 316) and physiology (e.g., BIOP 311 or BIOP 458). S-U grades optional. Lecs. T R 10:10–11:25. W. L. Kraus.
This course will examine 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 will focus on how these changes lead to alterations in normal cellular processes, as well as the resulting physiological consequences. Topics will be selected from the study of genetic mutations and the resulting physiological alterations in normal cellular processes, as well as the resulting physiological consequences. This course will examine how changes in the basis of the diseases, as well as possible pharmaceutical and genetic therapies for treating them, will be presented. A portion of each class period will be devoted to discussion and practice questions.

**[BIOGD 450 Vertebrate Development]**
Spring. 3 credits. Prerequisite: introductory biology. S-U and letter grades. Offered alternate years. Lecs. T R 1:40-2:55. K. Whitlock. This course is designed to examine the development of characteristics that make vertebrates unique. The course starts with an introduction to recent evolutionary and molecular approaches to understanding the rise of vertebrate structures. The development of vertebrate structures, such as neural crest, specialized sense organs, and limbs, is examined in detail with emphasis on the cellular and molecular events controlling their development.

**[BIOGD 480 Seminar in Developmental Biology]**
Fall or spring. 1 or 2 credits. May be repeated for credit. Limited to juniors and seniors. Prerequisite: BIOGD 281. S-U grades only. Seminar TBA. Staff.

**[BIOGD 481 Population Genetics]**
Fall. 4 credits. Prerequisite: BIOGD 281, BIOPH 278, or equivalents. Lecs. M W F 10:10; disc. M M 2:30 or T 1:25. C. F. Aquadro. Population genetics is the study of the transmission of genetic variation through time and space. The class explores how to quantify this variation, what the distribution of variation tells us about the structure of natural populations, and about the processes that lead to evolution. Topics include the diversity and measurement of genetic variation, mating and reproductive systems, selection and fitness, genetic drift, migration and population structure, mutation, multilocus models, the genetics of speciation, quantitative traits, and the maintenance of molecular variation. Emphasis is placed on DNA sequence variation and the interplay between theory and the data from experiments and natural populations. Specific case studies include the population genetic issues involved in DNA fingerprinting, genome structure and evolution of human populations, and the study of adaptation at the molecular level. Examples are drawn from studies of animals, plants, and microbes.

**[BIOGD 482 Human Genetics and Society]**
Fall. 4 credits. Enrollment limited to 24 senior biological sciences majors, with preference given to students studying genetics and molecular biology. Prerequisites: BIOGD 281 and BIOPH 330 or 333 or 331 and 332 and permission of instructor. S-U grades optional. T R 2:30-4:25. R. A. Calvo. 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. Among the topics considered are 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 483 Advanced Developmental Biology]**
Spring. 3 credits. Prerequisites: BIOGD 281, BIOPH 332 or 330 or 333, and BIOGD 380 or permission of instructor. Lecs. T R 2:30-4:00. Offered alternate years. Next offered spring 2007. M. E. Wolpert. An advanced course in developmental biology, with emphasis on the molecular events underlying developmental processes. Simultaneously, a molecular/cell biology course that focuses on how development modulates and uses transcriptional, post-transcriptional, translational, and post-translational regulation of gene expression and cellular events such as signal transduction and cell-cell communication. Numerous developmental systems are discussed and analyzed, including development of plants, and, especially, animals including fruit flies, nematode worms, and vertebrates such as mice, frogs, and humans. Course readings include original research articles. Discussion emphasizes specific experiments and approaches, and results and their interpretation.

**[BIOGD 485 Bacterial Genetics (also BIOMI 485 and BIOPH 485)]**
Fall. 2 credits. Prerequisite: BIOGD 281. Recommended: BIOMI 290 and BIOPH 330 or 331 and 332 or 333. Lecs. W 7:30-9:25 P.M. J. E. Peters. For course description, see BIOMI 485.

**[BIOGD 486 Advanced Eukaryotic Genetics]**
Spring, 4 credits. Prerequisites: BIOMI 290 and BIOPH 333 or 332 or 331 and 332 or permission of instructor. Lecs. T R 12:20-2:15 and R 12:20-1:10; disc. R 12:25-2:15 or F 11:15-12:05. E. E. Alani. The course develops fundamental skills in eukaryotic genetic analysis through lectures and by reading, analyzing, and presenting research articles. Concepts are presented within the context of a well-studied field, such as chromosone segregation. The basic tools that have been developed to study this field are used to analyze other topics such as vegetative and meiotic cell cycle control, embryonic development, pathogen resistance in plants, and human genetics.

**[BIOGD 487 Human Genomics]**
Fall. 3 credits. Prerequisite: BIOGD 281. Lecs. T R 9:05-10:15. A. G. Clark. Fundamental concepts of transmission, population, and molecular genetics will be applied to the problem of determining the degree to which familial clustering of diseases in humans has a genetic basis. Emphasis will be placed on the role of full genome knowledge in expediting this process of gene discovery. The role of statistical inference in interpreting genomic information will be stressed. Population genetics, and the central role of understanding variation in the human genome in mediating variation in disease risk, will be explored in depth. Methods such as haplotype mapping, linkage disequilibrium mapping, and admixture mapping will be examined. The course will be conducted as a series of lectures with classroom discussions. Assignments will include a series of problem sets and a term paper.

**[BIOGD 488 Mammalian Embryology (also BIOPH 489)]**

**[BIOGD 600 Development of Sensory Systems (also BIOMI 600)]**
Spring. 2 credits. Prerequisites: introductory biology, genetics, development, and neurobiology, or permission of instructor. S-U or letter grades. Lecs. M 7:00-8:40 P.M. Offered alternate years. K. Whitlock. This course explores the unique and shared mechanisms used in sensory system development of both vertebrates and invertebrates. The first class of the course provides a general introduction to the development of sensory systems in vertebrates and invertebrates. Following classes involve the reading of current and classic papers in sensory system development. Students choose a topic and articles from a list provided by the instructor. Students are responsible for an oral presentation and short paper.

**[BIOGD 638 Filamentous Fungal Genomics and Development (also PLPA 638)]**
Spring. 1 credit. S-U grades optional. Prerequisite: BIOGD 281 or equivalent, or permission of instructor. Lec. M W F 10:10 (4 weeks, last 4 of semester). B. G. Turgeson. Molecular genetic and genomic approaches to the study of fungal biology. Applications of contemporary methodology to genetic dissection of developmental processes, such as plant pathogenesis and reproduction. Examples are chosen from investigations of model plant pathogenic fungi and from well-known genetic models such as Aspergillus nidulans and Neurospora crassa.

**[BIOGD 682 Fertilization and the Early Embryo]**
Spring. 2 credits. Prerequisites: BIOGD 281; BIOPH 332, 330 or 333; and BIOGD 385 or permission of instructor. Lecs. R 2:30-4:25. Offered alternate years. Next offered spring 2008. J. E. Peters. This course treats the earliest events in the formation of a new organism. The methods and findings of genetic, developmental.
cell, and molecular analyses are discussed. Readings in the recent literature and discussions focus on pre-gastrulation embryos from several animal species. Topics include fertilization (sperm, egg binding, sperm entry into egg), pronuclear fusion, egg activation, initiation and terminating the cleavage, division period, cytoplasmic determinants, and changes in nuclear and cytoplasmic architecture."

**BIOGD 684 Advanced Topics in Population Genetics**

Spring. 2 credits. Limited to 20 students. Prerequisites: BIOGD 481 or equivalent and written permission of instructor. S-U grades optional. Lect. T. 2:30-4:25. Offered alternate years. A. G. Clark.

An in-depth exploration of current areas of research in population genetics. Readings primarily from recent books and the current literature. Specific topics are announced the previous fall and in the division's catalog supplement. Format includes lectures, presentations by students.

**BIOGD 687 Developmental Genetics**

Fall. 2 credits. Limited to 20 students. Prerequisites: BIOGD 281 and 385 or their equivalents. S-U grades optional. Lect TBA. Offered alternate years. Next offered 2005-2006. K. J. Kemphues.

Selected topics focus on the use of genetic analysis in understanding mechanisms of development. Topics are drawn primarily from studies in fruitflies, nematodes, mice, and fish. Possible topics include pattern formation, cell lineage, neural development, maternal information in development, germ cell development, sex determination, and intercellular communication. Students read current literature and are encouraged to discuss each topic in class.

**BIOGD 689 Cellular Basis of Development**

Fall. 2 credits. Prerequisites: BIOGD 281, BIOGD 385, and either BIOMI 330 or BIOMI 351-352. Lecs. W 2:30-4:25 P.M. S-U grades optional. Enrollment limited to 20 students. Offered alternate years. J. Liu.

This course focuses on the integration of different cellular processes in various developmental contexts. Topics include 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 780 Current Topics in Genetics**

Fall or spring. 1 credit. May be repeated for credit. Primarily for graduate students, with preference given to majors in the Field of Genetics. Written permission of instructor required for undergraduates. Limited to 20 students. No auditors. S-U grades only, with permission of instructor. Seminar TBA. Staff.

**BIOGD 781 Problems in Genetics and Development**

Fall. 2 credits. Limited to first-year graduate students in the Field of Genetics and Development. Disc TBA. E. Alani and staff.

An introduction to the research literature in selected areas through weekly problem sets and discussions.
and other living plants. The functional role of microorganisms in ecologically and environmentally significant processes is also considered through discussion of specific topics such as nutrient and toxic elemental cycles, transformation of pollutant chemicals, wastewater treatment, environmental biotechnology, and astrobiology.

**BIOMI 404 Pathogenic Bacteriology and Mycology (also VETMI 404)**

Spring. 2 or 3 credits (3 credits with lecture and seminar with permission of instructor for undergraduates). Prerequisites: BIOMI 290 and 291. Strongly recommended. BIO G 305. Lecs. M W 10:10; sem. F 10:10. Offered alternate even years. D. Debbie. This is a course in medical microbiology, presenting the major groups of bacterial and mycotic pathogens important to human and veterinary medicine. The emphasis of this course is infection and disease pathogenesis. Topics include disease causality; interactions of host-pathogen environment, including immunity to bacteria and fungi; and principles of antimicrobial therapy and drug resistance. A companion seminar addresses the current and classic literature related to microbial pathophysiology on the cellular and molecular level.

**BIOMI 409 Principles of Virology (also VETMI 409)**

Fall. 3 credits. Prerequisites: BIOMI 290, 291 or permission of instructor. Recommended: BIOMI 330–332, BIOMI 432. Letter only. Lecs. T R 12:55–2:05. G. R. Whitaker and S. G. Lazzaro. The course covers the principles of virology; focused mainly on animal viruses but also including plant viruses and bacteriophage. Topics include the classification of viruses, virus entry, genome replication and assembly, and virus pathogenesis. Particular emphasis is placed on virus-host cell interactions and common themes between different viral families.

**BIOMI 414 Bacterial Diversity**

Spring. 3 credits. Prerequisites: BIOMI 290, and 291, BIOMI 330 or 331 or 333 recommended. Lecs. M W F 11:15. Offered alternate odd years. S. H. Zinder. A consideration of the evolutionary biology, physiology, ecology, genetics, and practical potential of important groups of bacteria. Topics include molecular methods for determining bacterial phylogeny, the evolution of diverse mechanisms of energy conservation, fixation of carbon and nitrogen, and adaptation to extreme environments.

**BIOMI 416 Bacterial Physiology**

Spring. 3 credits. Prerequisites: BIOMI 290, 291 or BIOMI 330 or 331, or their equivalents. Lecs. M W F 11:00. Offered alternate even years. J. P. Shapleigh. The focus of the course is 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 417 Medical Parasitology (also VETMI 431)**

Fall. 2 credits. Prerequisites: courses pertaining to zoology and biology. Lecs. T R 3:35–4:25. D. Bowman. A systematic study of arthropod, protozoan, and helminth parasites of public health importance with emphasis on epidemiologic, clinical, and zoonotic aspects of these parasitisms.

**BIOMI 418 Microbial Ecology**

Spring. 3 credits. Prerequisites: BIOMI 290 and 291, or BIOMI 304 and instructor’s permission, and BIOMI 330 or 331 and 332, Lecs. M W 10:10–11:00; E. R. Angert. Understanding the role of microorganisms in natural environments is one of the greatest challenges facing microbiologists. This course introduces current biochemical and molecular techniques to assess community diversity and microbial activity in a variety of ecosystems. Other topics discussed include growth and survival, population biology, and microbial interactions.

**BIOMI 420 Microbial Genomics**

Spring. 2 credits. Prerequisites: BIOMI 290, BIO G 281, BIOMI 450, or equivalent. Lecs. T R 10:10–11:00. Offered alternate odd years. J. P. Shapleigh and J. D. Helmman. Genomic information is revolutionizing biology. We discuss 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 485 Bacterial Genetics (also BIOGD 485 and BIOM 485)**

Fall. 2 credits. Prerequisites: BIOGD 281. Recommended: BIOMI 290 and 330 or 331 and 332 or 333. Lecs. W 7:30–9:25 p.m. J. E. Peters. Participants in this course will gain a detailed understanding of how bacteria maintain and pass on genetic information with a strong focus on the bacterium Escherichia coli. Students will discover the processes by which bacteria evolve through different mutations and the exchange of genetic information. We will explore how genes are regulated efficiently through negative and positive regulation and by global regulatory mechanisms. We will also examine how the composition of the course students should understand the tools used to manipulate bacterial genomes for the understanding of bacteria and other living organisms.

**BIOMI 610 Introduction to Chemical and Environmental Toxicology (also TOX 610)**

Fall. 3 credits. Prerequisite: graduate standing in the field or consent of the instructor. Letter grades. Lecs. M W F 11:15–12:05. A. Hay. An introduction to the general principles of toxicology including the sources, mechanisms, and targets of toxic agents. Special attention is given 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 650 Molecular Plant Virology (also PL PA 606)**

Spring. 1 credit. Prerequisites: BIOMI 109, a course in cell biology, or permission of instructor. Lecs. M W 11:15 (7 weeks, 1st half of semester). Offered alternate years. S. G. Lazzaro. Introduces students to the molecular biology of plant virus replication and interactions with the host to produce disease. Material covered includes virus replication strategies, cell-to-cell and systemic movement, host defense responses and virus counterstrategies, and engineered resistance.

**BIOMI 651 Genomics of Bacterium-Host Interactions (also PL PA 608)**

Fall. 1 credit. S-U grades optional. Prerequisites: BIOMI 290 or equivalent or permission of instructor. Lecs. M W 9:05 (2nd half of semester). Offered alternate years. A. Collmer and S. Winans. Introduction to genomic approaches, tools, and discoveries involving the study of bacterial interactions with plant and animal hosts. Topics include the TGCRE Comprehensive Microbial Resource and Artemis tools, the pathogens Verminia pestis, V. enterococca, Pseudomonas syringae, Raustalismis solanacearum, and Agrobacterium tumefaciens, and the symbiotin Sinorhabdus meliloti.

**BIOMI 652 (Section 02) Molecular Plant-Microbe Interactions (also BIOP 652, Sec 02, PL PA 664)**

Spring. 1 credit. Prerequisites: BIOGD 281, BIOMI 330 or 331 or 333, and BIOP 653 (section 02) or their equivalents. Lecs. M W F 12:20 (12 lecs). Offered alternate even years. S. C. Winans. For course description, see BIOP 652, Sec 02.

**BIOMI 690 Prokaryotic Biology**

Fall and spring. 4 weeks/8 lectures. 1 credit/section to be offered. T R 10:15–11:30.

**Section 1—Microbial Structure and Function**

Fall. J. P. Shapleigh. Discussion of those macromolecules and assemblies 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.

**Section 2—Microbial Genetics**

Fall. J. D. Helmman. Reviews the fundamental concepts of microbial genetics including mutations and their analysis, plasmids, conjugation, transformation, transduction, transposition, recombination, repair, and mutagenesis.

**Section 3—Microbial Physiology/Diversity**

Fall. S. H. Zinder. The major energy-conserving modes of metabolism and their phylogenetic distributions among both bacteria and archaea are reviewed. Topics include phylogenetic analysis, fermentation, respiration, photosynthesis, pathways of carbon and nitrogen fixation, and evolution of the three domains of life.

**Section 4—Microbial Pathogenesis**

Spring. S. C. Winans. An introduction to the fundamental concepts of bacterial pathogenesis including the normal flora, pathogen entry and colonization, the production and regulation of toxins, horizontal transfer of pathogenesis determinants, and the roles of both specific and nonspecific host defenses. Examples will include bacterial pathogens of both animals and plants.
Section 5—Environmental Microbiology

Spring, E. L. Madson.

A core course of concepts, methods, and current literature that reveals the multidisciplinary nature of environmental microbiology and its relationship to prokaryotic biology. The crucial roles that microorganisms play in catalyzing biogeochemical reactions throughout the biosphere will be discussed.

BIOMI 740 Veterinary Perspectives on Pathogen Control in Animal Manure (also VETMI 700, also BIOMI 740)

Spring. 2 credits. Third- and fourth-year veterinary students. Letter grades only. Lect/Disc M W R for 8 weeks, 3:00–4:00. D. D. Bowman.

This course presents an in-depth look at the management of pathogens in animal manures. It reviews the pathogens involved, the role of governing agencies, the survival of pathogens in the field, and methods of pathogen destruction. The course discusses commercial methods of manure processing for the control of these pathogens for the protection of other animals and the human population. The course 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.

BIOMI 791 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, T 4:00–5:00, S. C. Winans; Sec 02 Environmental Microbiology, W 4:00–5:00, E. R. Angert.

Reading and presentation by graduate students of current literature in selected areas of modern microbiology.

BIOMI 795-796 Current Topics in Microbiology

Fall. 795, spring, 796. 0.5 or 1 credit for each topic. May be repeated for credit. Designed primarily for graduate students in microbiology. Prerequisite: upper-level courses in microbiology. S-U grades only. Lect TBA. Staff.

Lectures and seminars on special topics in microbiology.

BIOMI 797 Scientific Communication Skills

Fall and spring. 1 credit each semester. S-U grades only. F 2:30–3:20. 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 will be critically evaluated by the instructor. Feedback for improving the presentation and peer evaluations will be emphasized. Taken by students in the Graduate Field of Microbiology during their first two semesters, a third semester is optional.

BIOMI 798 Graduate Research Seminar in Microbiology

Fall and spring. 1 credit each semester. Required of all graduate students in the Graduate Field of Microbiology. S-U grades only. F 1:25–2:15. Staff.

All graduate students in the Field of Microbiology are required to attend BIOMI 798 and are required to present a seminar concerning their research at least once each year.

BIOMI 799 Microbiology Seminar

Fall and spring. Required of all graduate students in the Graduate Field of Microbiology and open to all who are interested. Sem R 4–5. Staff.

Related Courses in Other Departments

- Advanced Food Microbiology (FD SC 607)
- Advanced Immunology Lectures (BIOL G 705 and VETMI 705)
- Advanced Work in Bacteriology, Virology, or Immunology (VETMI 707)
- Bacterial Plant Diseases (PL PA 647)
- Basic Immunology, Lectures (BIOL G 305 and VETMI 315)
- Ecology of Soil-Borne Pathogens (PL PA 644)
- Food Microbiology, Laboratory (FD SC 395)
- Food Microbiology, Lectures (FD SC 394)
- Immunology of Infectious Diseases and Tumors (BIOL G 706 and VETMI 719)
- Introduction to Scanning Electron Microscopy (BIOL G 401)
- Intracellular Mycology (PL PA 309)
- Light and Video Microscopy for Biologists (BIOL G 450)
- Limnology: Ecology of Lakes, Lectures (BIOL EE 457)
- Magical Mushrooms, Mischievous Molds (PL PA 201)
- Microbiology for Environmental Engineering (CEE 451)
- Plant Virology (PL PA 645)
- Principles of Biochemistry (BIOL EE 668)
- The Soil Ecosystem (CSS 366)

NEUROBIOLOGY AND BEHAVIOR (BIONB)

- BIONB 111 Brain Mind and Behavior (also PSYCH 111 and COGST 111)


See COGST 111 for description.

- BIONB 221 Neurobiology and Behavior I: Introduction to Behavior

Fall, 3, 4, or 5 credits (4 credits with one discussion per week). Prerequisite: 1 year of introductory college biology. S-U grades optional. Course fee: none. Six-week session. M–F 4:00–5:15. Staff.

A general introduction to the field of behavior. Topics include evolution and behavior, behavioral ecology, sociobiology, chemical ecology, communication, orientation and navigation, and hormonal mechanisms of behavior.

- BIONB 222 Neurobiology and Behavior II: Introduction to Neurobiology

Spring. 3 or 4 credits (4 credits with discussion and written projects). 4-credit option required of students studying neurobiology and behavior. Each discussion section limited to 15 students, with preference given to students studying neurobiology and behavior. Not open to freshmen. Prerequisite: 1 year of introductory biology for majors and 1 year of chemistry. May be taken independently of BIONB 221. S-U grades optional. Lect, M W F 12:20; disc TBA, C. D. Hopkins and staff.

A general introduction to the field of cellular and integrative neurobiology. Topics include neural systems, neuroanatomy, developmental neurobiology, electrical properties of nerve cells, synapses, neurotransmitters, synaptic mechanisms, motor systems, sensory systems, learning, and memory. Some discussion sections include dissections of preserved brains.

- BIONB 322 Hormones and Behavior (also PSYCH 322)

Fall. 3 credits. Two lectures plus a section in which students read and discuss original papers in the field, give an oral presentation, and write a term paper. Limited to juniors and seniors. Prerequisite (any one of the following): PSYCH 223, or BIONB 221, or BIOMI 719, VETMI 719, or one year of introductory biology plus a course in psychology. Letter grades only. Graduate students may not use the course for credit toward major. Letter grades only. Lect, M W F 11:15. E. Adkins Regan.

See PSYCH 322 for description.

- BIONB 323 Methods in Animal Behavior


Covers methods for observing, quantifying, and analyzing behavioral interactions and communication signals. Lectures plus a series of workshops and projects designed to introduce students to commonly used field and laboratory methods. Emphasis on experimental design and basic statistical techniques. Some lab work with live insects included. Additional lab time often needed to complete projects.
This course covers the basic ideas and techniques involved in computational neuroscience. The course 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.

[BIONB 392 Drugs and the Brain
Fall. 4 credits. Prerequisites: BIONB 222 or equivalent course in neurobiology with permission of instructor. A knowledge of biochemistry is useful but not required. S-U grades optional. T R 10:10-11:15; disc. TBA. Offered alternate years. Fall 2004-2005. R. M. Harris-Warrick and L. M. Nowak.

An introduction to neuropharmacology, with an emphasis on the neural mechanisms of psychoactive drugs. Topics include a brief introduction to neuropharmacology and a discussion of the major neurotransmitter families. The rest of the course covers the major psychotropic drugs, including cocaine, heroin, psychedelics, marijuana, and alcohol, as well as pharmaceuticals for the treatment of anxiety, schizophrenia, and depression. The course includes a term paper in the form of a grant proposal to study a current problem in neuropharmacology.

[BIONB 394 Circadian Rhythms (also BIOS 394, ENTM 394, and PL PA 394)
Fall. 2 credits. Prerequisite: 200-level biology course. S-U grades optional. Lec. T R 10:10-11:15. K. Lee (fall, even years) and J. Ewer (fall, odd years).

For description, see ENTM 394.

[BIONB 396 Introduction to Sensory Systems (also PSYCH 396 and 696)
Spring. 4 credits. Limited to 25 students. Prerequisites: an introductory course in biology or biopsychology, plus a second course in behavior and cognition, perception.

Topics include: sensory coding, learning in neural networks and in brain structures, memory models of the hippocampus, sensory coding, and others.

[BIONB 420 Topics in Neurobiology and Behavior
Fall or spring. Variable credit. May be repeated for credit. Primarily for undergraduates. S-U grades optional. TBA.

Courses on selected topics in neurobiology and behavior; can include lecture and seminar courses. See department office (W363 Mudd Hall) for offerings.

[BIONB 421 Effects of Aging on Sensory and Perceptual Systems (also PSYCH 431 and 631)
Fall. 3 or 4 credits. The 4-credit option involves a term paper or creation of a relevant web site. Limited to 25 students.

Prerequisites: an introductory course in biology or psychology, plus a second course in perception, neurobiology, cognitive science, or biopsychology. T R 10:10-11:15. B. P. Halpem.

For description see PSYCH 431.

[BIONB 422 Modeling Behavioral Evolution
Spring. 4 credits. Limited to 25 students. Prerequisites: BIONB 221, 1 year of calculus, 1 course in probability or statistics, and permission of instructor.

This course is open to advanced undergraduates and graduate students. S-U grades optional. Lec. T R 2:55-4:10; computer lab, 1 class period per week. TBA. Offered alternate years. H. K. Reeve.

This is an intensive lecture and computer lab course on modeling strategies and techniques in the study of behavioral evolution. Population-genetic (including quantitative-genetic), static optimization, dynamic programming, and game-theoretic methods are emphasized. These approaches are illustrated by application to problems in optimal foraging, sexual selection, sex ratio evolution, animal communication, and the evolution of cooperation and conflict within animal social groups. Students learn to critically assess recent evolutionary theories of animal behavior, as well as to develop their own testable models for biological systems of interest or to extend pre-existing models in novel directions. The Mathematica software program is used as a modeling tool in the accompanying computer lab (no prior experience with computers required).
A writing-intensive advanced course for upper-division students interested in behavioral ecology and sociobiology. Lectures, discussions, and student presentations examine topics including adaptation, communication, mating systems, sexual selection, sex ratios, inbreeding and outbreeding, altruism, kin recognition, conflict and cooperation in animal societies, and Darwinian medicine.

**BIONB 417** Developmental Neurobiology Fall. 3 credits. Prerequisites: two courses from BIONB 222, BIOMG 281, BIOMB 330 or BIONB 351; co-registration in one of the two is acceptable with permission of instructor. Open to advanced undergraduates. S-U grades optional. MWF 11:10-12:05. Offered alternate years. Not offered 2004-2006. B. R. Land.


**BIONB 406** Biometric Signals in Animals and Man Fall. 3 credits. Limited to 12 junior, senior, and graduate students. Prerequisites: 1 year of introductory biology, PHYS 101-102 or 207-208, and permission of instructor. S-U grades optional. Lecs., M W 9:30-10:45; lab. T Th 10:50-12:05. B. R. Land.
sensing plays a critical role in predator detection and avoidance. This course teaches students about animal acoustic signaling by introducing them to various animal acoustic systems. The course presents the physical properties of sound, physiological mechanisms for sound production and hearing, and the behavioral contexts in which sounds are used. Acoustic techniques are provided in the laboratory where students learn how to record, synthesize, and analyze sounds with the aid of recorders and Mac and/or PC computers running customized software. Labs are designed around the lecture material and provide practical "real-world" exercise designed to stimulate discovery of fundamental principles described in lectures. Class research projects on a selected topic in bioacoustics are required. Engineering students with interests in music, audio analysis, digital signal processing, and computer science are encouraged. 

BION 531 Topics in Cognitive Studies
(also COGST 531, LING 531, PSYCH 531, COM S 531)
Spring. 4 credits. Prerequisites: COGST 501, PSYCH 214, or permission of instructor. Open to advanced undergraduates. S-U grades optional. M 4:30-6:30 P.M. S. Edelman and H. Segal. See COGST 501 for description.

BION 600 Development of Sensory Systems (also BIOGD 600)
Spring. 2 credits. Prerequisites: Introduction to biology (genetics, development, and neurobiology preferred, or permission of instructor). S-U grades only. M 7:00-8:40 P.M. K. Whitlock. This course will explore the unique and shared mechanisms used in sensory system development of both vertebrates and invertebrates. The first class of the course will provide a general introduction to the development of sensory systems in vertebrates and invertebrates. Following classes will involve the reading of current and classic papers in sensory system development. Students will choose a topic and articles from a list provided by the instructor. Students will be responsible for an oral presentation and short paper.

BONB 721 Introductory Graduate Survey in Neurobiology and Behavior
Fall. 2 credits. Required of graduate students majoring in neurobiology and behavior. Class meets weekly for two hours. Students also prepare a research proposal on a potential topic for their thesis research (in the formal registration or NIH grant). This proposal is prepared in consultation with one or more relevant faculty members.

Related Courses in Other Departments
Evolutionary Perspectives on Behavior (PSYCH 535)
Biopsychology of Normal and Abnormal Behavior (PSYCH 361 and NS 361)
Developmental Biopsychology (PSYCH 422)
Evolution of Human Behavior (PSYCH 326)
Insect Behavior Seminar (ENTOM 662)
Topics in Biological Anthropology (ANTHR 490)
Primate Behavior and Ecology (ANTHR 390)
Teaching Experience (BIO G 498)
The Brain and Sleep (PSYCH 440/640)
Undergraduate Research in Biology (BIO G 499)
OTS Undergraduate Semester Abroad Programs
Shoals Marine Laboratory Program

PLANT BIOLOGY (BIOPL)

BIOPL 240 Green World/Blue Planet
Summer (6-week session). 3 credits. S-U grades optional. Limited to 12 students. Lecs. M-F 10:00-11:15. T. Silva. This course 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 241 Introductory Botany
Fall. 3 credits. Lecs. T 9:05, lab, M T W or R 12:54-2:25, or M W 7:30-8:45 P.M. K. J. Niklas. Introductory botany for those interested in the plant sciences. Emphasizes structure, reproduction, and classification of flowering plants. Much of the laboratory work is conducted outdoors taking advantage of several superb natural areas which are available for study. Those who lack college-level biology are expected to work
BIOPL 247 Ethnobiology  
A consideration of the principles, methods, and issues of ethnobiology. Emphasis is on the past and present ecological, evolutionary, economic, and cultural interrelationships of humans in traditional and modern societies with their plants and animals, as a means of understanding the place and future of humans in the biosphere. Traditional medicines, underutilized organisms, resource management, and ownership of nature, and methodology are among the topics covered.

BIOPL 248 Taxonomy of Vascular Plants  
An introduction to current studies involving 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 includes methods of plant identification and presents an overview of vascular plant diversity, with particular attention to the flowering plants.

BIOPL 340 Methods in Biological and Biochemical Prospecting  
Student participants learn theory and methodology in ethnobotany, chemical ecology, and zoopharmacognosy as they apply in a multidisciplinary fashion to chemical prospection. The use of techniques in the chemistry of natural products and biological assays in the discovery of chemicals and their role in nature is described. Classical examples of drug development, from quinine to taxol, in the course of chemical prospection are discussed. An overall medicinal purpose is emphasized, with mention of specific worldwide spread of diseases pressing for new drugs.

BIOPL 342 Plant Physiology, Lectures  
Spring. 3 credits. Prerequisites: 1 year of introductory biology and either concurrent enrollment in BIOPL 344 or written permission of instructor. May not be taken for credit after BIOPL 342 unless written permission is obtained from instructor. Lecs, T R 10:10–11:25. T. G. Owens.  
An integrated and interdisciplinary study of the processes that contribute to the growth, competition, and reproduction of plants. Topics include, but are not limited to, water relations, membrane properties and processes, photosynthesis, plant respiration, mineral and organic nutrition, stress physiology, control of growth and development, and responses to the environment. Emphasis is on the relationship between structure and function from the molecular to the whole-plant level.

BIOPL 343 Molecular Biology and Genetic Engineering of Plants  
Spring. 2 credits. Prerequisite: 1 year of introductory biology or permission of instructor. S-U grades optional. Lecs, T R 11:15. M. E. Nasrallah.  
An introduction to current studies involving recombinant DNA technology and its application to the improvement of plants. The course emphasizes genetic transformation methodology, gene expression systems, and strategies for increasing productivity. The course is directed toward undergraduates who wish to become familiar with the theory and practice of plant biotechnology.

BIOPL 344 Plant Physiology, Laboratory  
Spring. 2 credits. Prerequisite: concurrent enrollment in BIOPL 342. May not be taken for credit after BIOPL 244. Similar to BIOPL 244 but at a more advanced level. Lab, R 1:25–4:25; disc, R 12:20. T. Silva.  
Experiments exemplify concepts covered in BIOPL 342 and offer experience in a variety of biochemical and biological techniques, from the cellular to whole plant level, with emphasis on experimental design.

BIOPL 345 Plant Anatomy  
Fall. 4 credits. Limited to 15 students. Prerequisite: 1 year of introductory biology or a semester of botany. Lecs, M W 9:05; labs, M W 2:00–4:25. Offered alternate years. Not offered 2004–2005. Staff.  
A descriptive course with equal emphasis on development and mature structure. Lecture, laboratory, and reading are integrated in a study guide. The laboratory offers the opportunity to develop the practical skills required to make anatomical diagnoses and to write anatomical descriptions.

BIOPL 347 Laboratory in Molecular Biology and Genetic Engineering of Plants  
Spring. 2 credits. Limited to 24 students. Prerequisite: BIOPL 343 or permission of instructor. Concurrent enrollment is BIOPL 345 is encouraged. S-U grades optional. Lab, W 12:25–4:25. Offered alternate years. K. C. Nixon.  
A companion to BIOPL 343 with laboratory activities that focus on the practice of plant biotechnology. Students will transfer genes to plants by a variety of methods and will analyze their expression in the host genome by use of reporter gene assays, and by the preparation and analysis of nucleic acids.

BIOPL 348 The Healing Forest  
An ethnobotanical and ethnopharmaceutical consideration of the role of plants, fungi, and insects in traditional and western medicine. Studies of indigenous and lay societies illustrate the ecological, systematic, biochemical, and cultural aspects of herbal medicines and are placed in the broader context of such interdependent themes as the conservation of biological and cultural diversity, human health, bioprospecting, compensation for indigenous knowledge, and sustainable development.

BIOPL 359 Biology of Grasses  
Fall. 2 credits. Prerequisite: 1 year of introductory biology or a course in plant systematics or permission of instructor. S-U grades optional. Lecs, T 1:25–2:15; lab, T 2:30–4:25. Offered alternate years. J. I. Davis.  
Systematics and related aspects of the biology of the graminoid plant families (grasses, sedges, and rushes), with the principal emphasis on grasses. Major topics include phylogenetics, taxonomy, physiology, reproductive biology, speciation, and biogeography. The roles of graminoid plants in natural and human-disturbed environments are discussed, as are the origins of cultivated species.

BIOPL 404 Crop Evolution, Domestication and Diversity (also PL BR 404, IARD 404)  
Fall. 2 credits. S-U letter. Prerequisites: Genetics 281 or Plant Breeding 225 or permission of the instructor. Lecs, T R 9:05. S. Kresovich.  
See PL BR 404, for description.

BIOPL 422 Plant Development  
Fall. 2 credits. Lecs, T R 9:05–9:55. Prerequisites: course work in molecular biology (e.g., BIOBM 330, 331, 332, or 333), or genetics (e.g., BIOGD 281), or permission of instructor. S-U grades optional. J. Hua.  
An introduction to plant development, studying the mechanisms of morphogenesis and cell fate determination at the organismal, cellular, and molecular levels.

BIOPL 440 Phylogenetic Systematics  
Spring. 4 credits. Limited to 24 students. Prerequisite: introductory biology or permission of instructor. Lecs, T R 10:10; labs, T R 2:00–4:25. Offered alternate years. K. C. Nixon.  
Basic and advanced theory and methods of phylogenetic analysis. Students are introduced to cladistic analysis using parsimony and gain experience with computer-aided analysis of taxonomic data, including both morphological and molecular data. Topics discussed include applications of phylogenetic methods to biogeography and evolutionary studies.

BIOPL 442 Current Topics in Ethnobiology  
Explorations of the interrelationships of plants and animals with humans from a wide range of perspectives. Topics considered are contemporary issues, theory, and methodology of ethnobotany and ethnobiology, and the role of plants and animals in human lives, in subsistence and exchange, and in thought.

BIOPL 443 Topics and Research Methods in Systematics  
Fall or spring. 1–2 credits (1 credit per section). Prerequisite: written permission of instructor. S-U grades optional. Staff. A 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 444 Plant Cell Biology
Fall. 4 credits. Limited to 24 students. Prerequisites: 1 year of introductory biology or permission of instructor. Lecs, M W F 9:05; lab, M or W 1:25–4:25 R. O. Wayne.

Evidence from microscopy, physiology, biochemistry, and molecular biology is used to try to unravel the mystery of the living cell. The dynamics of protoplasm, membranes, and the various organelles are studied. The mechanisms of cell growth and division, the relationship of the cytoskeleton to cell shape and motility, the interaction of the cell with its environment, and the processes that give rise to multicellular differentiated plants are investigated.

BIOL 447 Molecular Systematics
Fall. 3 credits. Prerequisites: BIOE 278 or BIOGD 281 or BIOBM 330, or BIOBM 332, or written permission of instructor. Lecs, T R 8:30–9:55. Offered alternate years. Not offered 2004–2005. J. J. Doyle.
The 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 organelar genomes is described from the standpoint of their suitability for systematic and evolutionary studies.

BIOL 448 Plant Evolution and the Fossil Record
Spring. 3 credits. Prerequisite: BIOL 241 or equivalent, or permission of instructor. Lecs, T R 9:00; lab, R 12:20–2:15. Offered alternate years. K. J. Niklas and W. C. Crepet.

An introduction to evolution, surveying major changes in plants from the origin of life to the present. Emphasis is placed on plant form and function, adaptations to particular ecologic settings, and evolutionary theory as it relates to plants.

BIOL 449 Green Signals and Triggers—The Plant Hormones (also MORT 449)
Fall. 3 credits. S-U grades optional. Prerequisite: 1 year of introductory biology and plant physiology (BIOL 242 or 342) or permission of instructor. F 1:25–2:15. Offered alternate years. Not offered 2004–2005. P. J. Davies.

A study of plant hormones and how they regulate plant growth and development. Topics covered include the discovery, role in growth and development, mode of action, and practical uses of the plant hormones auxin, gibberellins, cytokinins, abscisic acid, ethylene, and brassinosteroids.

BIOL 452 Systematics of Tropical Plants

An 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-plant" context. Two-week field trip over winter break.

BIOL 453 Principles and Practice of Historical Biogeography (also ENTOM 453)

A survey of techniques in historical biogeography and the development of modern biogeographic theory in the context of classical, ecological, and phylogenetic analytical methodologies. Geological and paleontological aspects of biogeography are presented, and large-scale biogeographic patterns discussed. Laboratories focus on computer applications and discussion of controversial issues.

BIOL 454 Systematics of Tropical Plants: Field Laboratory
Spring. 1 credit. Limited to 15 students. Prerequisite: prior enrollment in BIOL 453 or permission of instructor. Letter grades only. For more details and application, contact the L. H. Bailey Hortorium, 467 Mann Library. Offered every three years. Not offered 2004–2005. K. C. Nixon.

An 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-plant" context. Two-week field trip over winter break.

BIOL 456 Biomolecules of Plants (also BEE 456)
Fall. 3 credits. Prerequisites: upper-division undergraduate or graduate status, completion of introductory sequence in biology and one year of calculus, or permission of instructor. S-U or letter grade optional. Lecs, T R 11:15–12:05; disc, W 2:30–3:20. J. R. Cooke and K. J. Niklas. See BEE 456, for description.

BIOL 462 Plant Biochemistry
Spring. 3 credits. Prerequisites: BIOL 242 or 342 or equivalent or BIOL 330 or 331 or equivalent or permission of instructor. Letter-grade only. Lecs, M W F 9:05. J. Rose and K. Van Wijk.

This course 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.

BIOL 464 Laboratory in Plant Molecular Biology (also BIOBM 841)
Fall. 4 credits. Prerequisites: BIOL 281 or equivalent, or BIOL 330 or 331 or equivalent, and permission of instructor. S-U grades with permission of instructor. Lab, T R 12:20–4:25. J. B. Nasrallah, M. R. Haufler, S. G. Lizarowitz, G. Martin and B. G. Turgeman.

Selected experiments on gene expression, gene transfer, and assay of reporter genes in plants. The course emphasizes the application of molecular biology methodology to plant systems. Additional lab time is required to complete assignments.

BIOL 465 Plant Mineral Nutrition (also CSS 642)

A detailed study of the processes by which plants acquire and use mineral nutrients from the soil. Topics include uptake, translocation, and compartmentation of mineral elements; root-soil interactions; the metabolism of mineral elements; the involvement of mineral nutrients in various physiological processes, as well as the interaction of plants adapted to extreme environmental stresses (e.g., acid soils). Specific mineral elements are emphasized to illustrate these topics.

BIOL 467 Seminar in Systematic Botany
Fall or spring. 1 credit. May be repeated for credit. Prerequisite: written permission of course coordinator required for undergraduates. S-U grades optional. Sem, T 12:20. Bailey Hortorium staff.

Lectures and discussions led by staff, visitors, and students on topics of current importance to systematic botany.

BIOL 469 Solute Transport in Plants (also BEE 469)
Fall. 3 credits. Letter only. Lecs T R 10:10–11:25. Offered alternate years. R. M. Spanswick.

See BEE 469 for description.

BIOL 471 Water Transport in Plants (also BEE 471)

See BEE 467 for description.

BIOL 472 Plant Molecular Biology II
Spring. 1–6 credits (1 credit per section). Prerequisites: BIOGD 281 and BIOBM 330 or 332, or their equivalents. Recommended: BIOBM 351. S-U grades optional.

A series of four-week modules on specialized topics. Coordinator: J. B. Nasrallah.

Section 01 Molecular Plant-Pathogen Interactions I and II (also PL PA 662)
1 credit. Lecs, M W F 10:10 (12 lecs).


An examination of the molecular and cellular factors that control pathogen-plant interactions from the perspectives of plant 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, apoplastic 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.

Section 02 Molecular Plant-Microbe Interactions (also BIOM 652, PL PA 664)

Course focuses on the interactions of Agrobacterium and Rhizobium with plants. Topics on Agrobacterium-plant interactions include plant-microbe recognition mechanisms, T-DNA transfer process, oncogenesis, and use of Agrobacterium to produce transgenic plants. Topics on Rhizobium-plant interactions include regulation of nitrogenase activity and expression and function of the symb plasmid, nodule development, and plant genetics involved in plant-microbe interaction.

Section 03 Light Signal Transduction in Plants
1 credit. S-U grades optional. Lecs, M W F 10:10 (12 lecs) Mar. 26-Apr. 22. T. Brinell. 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 regulate plant photosynthesis rates. This course focuses on recent studies that have illuminated the molecular basis of light signal transduction networks in higher plants. Readings will be assigned from current literature on those topics that use genomics tools such as microarray analysis to address fundamental questions in red/far-red and blue light signal transduction.

Section 04 Plant Gene Evolution and Phylogeny
1 credit. Lecs, M W F 1:25 (12 lecs). 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 genetic 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 on gene phylogeny, and the implications of using gene or allele phylogenies to infer organismal evolutionary patterns.

Section 05 Molecular Biology of Plant Organelles (also BIOBM 652-5)
1 credit. S-U grades optional. Lecs, M W F 10:10-1:25 (Mar. 19). M. R. Hanson and D. B. Stern. An in-depth examination of the molecular biology of plant mitochondria and plastids. Topics include the organization, evolution, and expression of organelle genomes, RNA editing, and the expression of nuclear genes encoding structural or regulatory organelle proteins. Special topics include mitochondrially encoded cytoplasmic male sterility, transformation and expression of foreign genes in chloroplasts, and the use of genetics to investigate nuclear-organelar interactions.

Section 06 Plant Biotechnology (also PLBR 652 and PLPA 662-2)
1 credit. S-U grades optional. Lecs, M W F 10:10-1:25 (12 lecs) Mar. 28-Apr. 22. M. Zaitlin and E. D. Earle. This course deals with production and uses of transgenic plants for agricultural and industrial purposes. Topics include procedures for gene introduction and control of gene expression, as well as strategies for obtaining transgenic plants that are resistant to insects, diseases, and herbicides, produce useful products, or have improved nutritional and food processing characteristics. Regulatory and social issues relating to plant biotechnology are discussed.

Section 07 Plant Cell Walls: Structure to Proteome
1 credit. S-U grades optional. Lecs, M W F 10:10-12:15 (March 28-Apr. 22. J. Rose. This course examines the structure and function of plant cell walls, exploring their dynamic nature and fundamental contribution to numerous aspects of plant growth and development. Topics include: wall biosynthesis; wall structure and composition; regulation of cell expansion and differentiation; defense against pathogens and signaling; the apoplast as a metabolically active subcellular compartment; and analytical techniques: from biochemistry to proteomics.

BIOL 653 Plant Molecular Biology I
Fall. 1-3 credits (1 credit per section). Prerequisites: BIOGD 281 and BIOBM 330 or 332, or their equivalents. Recommended: BIOBM 331, S-U grades optional. Coordinator: J. B. Nasrallah. A series of four-week modules on specialized topics.

Section 01 Concepts and Techniques in Plant Molecular Biology (also PL PA 663.01, PL BR 653.01)
2 credits. Lecs, M W F 10:10 (24 lecs) Sept. 5-Oct. 29. S. R. McCouch, J. Giovannoni and J. Rose. This is an introductory module that provides a broad overview of molecular biology concepts relevant to the plant sciences. This course serves as a prerequisite to other modules in the BIOBM 653-656 series and BIOL 652 (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 genomic 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 will consist of two lectures and one day of discussion per week. Course material will be coordinated with BIOL 641 (lab). Emphasis is on understanding techniques and approaches that are appropriate for different experiments and objectives.

Section 02 Proteomics in Plant Biology
1 credit. S-U grades optional. Lecs, M W F 1:25 (12 lecs) Oct. 1-29. K. van Wijk. Introduction to proteomics and mass spectrometry and its application in plant biology. Course 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; phosphoprotein mapping. We will discuss limitations and possibilities of proteomics on plants for which little sequence information is available and experimental papers involving plant proteomics.

Section 03 Plant Genome Organization and Function (also PLBR 653.5)
1 credit. S-U grades optional. Lecs, M W F 10:10-12:15 (12 lecs). Offered alternate years. S. D. Tanksley. This course 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.

Section 04 Molecular Aspects of Plant Development I (also BIOBM 653.4)
1 credit. Lecs, M W F 10:10 (12 lecs) Nov. 1-Dec. J. J. B. Nasrallah. This module 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 organs and cells are discussed. Topics include cell-cell signalling in the establishment of pattern and differentiation of specialized cell types, and the control of developmental pathways by endogenous and external cues. The module is a companion to BIOL 652, Sec. 02 (Molecular Aspects of Plant Development I).

Section 05 Molecular Breeding (also PLBR 653.4)
1 credit. Lecs M W F 10:10-12:15 (12 lecs). Offered alternate years. Not offered 2004-2005. 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.

Section 06 Plant Senescence (also HORT 625.02)
1 credit. S-U grades optional. (12 lecs) S. Gan. This course introduces molecular, genomics and proteomics approaches in plant senescence and postharvest research. Topics include gene expression, regulation, and function associated with physiological and biochemical changes in senescing, maturing, and/or ripening plants or parts. Genetic manipulation of senescence/ripening processes will also be discussed.

BIOL 654 Botanical Nomenclature
Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades only. Lec and disc TBA. Offered alternate years. Not offered 2004-2005. Staff. An analysis of the International Code of Botanical Nomenclature and its application to various plant groups.

BIOL 656 Topics in Plant Evolution
Spring. 1 credit. Prerequisite: BIOL 448 or equivalent background in evolution, or written permission of instructor. Lab and disc TBA. Offered alternate years. K. J. Niklas. A 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.

BIOL 740 Plant Biology Seminar
Fall and spring. No credit (no official registration). Required of graduate students doing work in plant biology. Sem, F 11:15. Staff. Lectures on current research in plant biology, presented by visitors and staff.
Plant Cytogenetics Laboratory (PL BR 446)
Teaching Experience (BIO G 498)
Undergraduate Research in Biology (BIO G 499)

**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 offered through the Office of Undergraduate Biology, the undergraduate specialization in Ocean Sciences offered through the Science of Earth Systems Program, and the summer program of courses offered by the Shoals Marine Laboratory. Further information on these programs can be found at the Cornell Marine Programs Office, G14 Stimson Hall, or on their website, www.sml.cornell.edu.

**Undergraduate Specialization in Marine Biology and Oceanography**

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 requirements, students in marine biology are encouraged to enroll in the following courses:

1. BIOE 154, The Sea: An Introduction to Oceanography
2. BIOSM 364, Field Marine Science, or BIOSM 375 Field Marine Biology and Ecology, and at least one 400-level BIOSM field course at the Shoals Marine Laboratory,
3. BIOE 462, 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:

1. BIOE 573 Biology of the Marine Invertebrates
2. BIOE 457 Limnology
3. BIOE 462 Marine Ecology
4. BIOE 478 Ecosystem Biology
5. BIOE 490 Topics in Marine Biology
6. BIOSM 303 Ecology of Marine Fisheries
7. BIOSM 308 Marine Microbial Ecology
8. BIOSM 309 Climates and Ecosystems

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**SHOALS MARINE LABORATORY (BIOSM)**

The objective of the Shoals Marine Laboratory (SML) is to provide undergraduates and other interested adults a unique opportunity to explore marine sciences in an island setting noted for its bio, geology, and history. SML has established a national reputation for excellence and has become North America's largest marine field station focusing on undergraduate education.

The summer population of Appledore Island is limited to about one hundred people at any one time. Participants and faculty members can 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 marine 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. Typical day consists of lecture sessions, laboratory and field work, field trips to nearby islands and the mainland, and collecting and research excursions aboard the laboratory's 47-foot research vessel, John M. Kinne. Field experience is an integral component of all courses, using Appledore's extensive intertidal and subtidal zones, wading bird rookeries, 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 teaching ability in the field. In addition, there are numerous guest lecturers including engineers, coastal planners, and specialists from private industry, government, and the academic community.

The Ithaca campus functions of the Shoals Marine Laboratory are centered in the Cornell Marine Programs Office, G14 Stimson Hall. The office serves as an advising center for students interested in marine sciences, maintains a browsing library with updated information on graduate study and career opportunities as well as on marine programs at other institutions, and administers the SEA Semester, a 17-credit program offered in cooperation with the Sea Education Association (SEA).

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 catalog for current offerings.)

**BIOSM 160 The Oceanography of the Gulf of Maine**

Summer. 4 credits. Limited to 24 students. A special 2-week course offered aboard a Sea vessel and at Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Stimson Hall. Daily lecs, labs, and fieldwork for two weeks. SML faculty.

An exciting opportunity to explore the offshore and near-coastal environments of the Gulf of Maine for pre-college and first-year non-science majors. 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 161 Introduction to Marine Science**

Summer. 4 credits. S-U grades optional. A special two-week course offered at Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Stimson Hall. Daily lecs, labs and fieldwork for two weeks. This course 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 andurchin barrens.

**BIOSM 162 Marine Environmental Science**

Summer. 3 credits. Prerequisite: open to high school students who have successfully completed two high school science courses. The special 12-day course offered at Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Stimson Hall. Daily lecture, labs, and fieldwork for 12 days. SML faculty.

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 will focus on coastal marine habitats, with an emphasis on issues as they relate to global habitats and concerns. The special course will include explorations along Appledore Island’s rocky intertidal zone and excursions to neighboring islands to observe harbor seal and seabird colonies. Offshore cruises will include observing the scientific research methods and equipment will be introduced, and each student will have the opportunity to be involved in group research projects.

**BIOSM 204 Biological Illustration**

Summer. 2 credits. A special 1-week course offered at Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Stimson Hall. Daily sessions for one week. General discussion of scientific publishing, illustration labeling, color techniques, and printing processes. The course provides an opportunity to the scientist or science student a chance to gain experience in the biological illustration. Lab and field trips to seabird and whale foraging grounds. Lectures and discussions will expose students to topics ranging from fishes to seabirds, seabirds to lobsters, and plankton to whales. Fundamental scientific research methods and equipment will be introduced, and each student will have the opportunity to be involved in group research projects.

**BIOSM 303 Ecology of Marine Fishes**

Summer. 4 credits. Prerequisite: 1 year of college-level biology. SCUBA certification recommended, not required. S-U grades optional. A special two-week course offered at Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Stimson Hall. Daily lecs and fieldwork for two weeks. Not offered 2005. SML staff.

This course presents principles, models, and methods for analysis of dynamics of fish populations and communities, and analysis of current research in fisheries ecology and its potential uses in fisheries management. Lab and field activities emphasize collection and analysis of data from the Gulf of Maine and adjacent estuarine habitats.

**BIOSM 308 Marine Microbial Ecology**

Summer. 4 credits. Prerequisite: 1 year of college-level biology. S-U grades optional. A special two-week course offered at Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Stimson Hall. Daily lecs and fieldwork for two weeks. Not offered 2005. SML staff.

This course examines the fundamental role of marine microbial communities in the function of the biosphere. Lectures survey bacterial, protistan, and microbial diversity. Literature and case studies from Arctic to deep sea vent communities. Laboratory exercises cover several principles techniques of field microbial ecology and explore the rich marine microbial environment surrounding the Isles of Shoals.

**BIOSM 309 Climates and Ecosystems**

Summer. 4 credits. Prerequisite: 1 year of introductory college biology. Recommended: course work in ecology, psychology, or behavior. S-U grades optional. A special two-week course offered at Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Stimson Hall. Daily lecs, labs, and fieldwork for two weeks. SML faculty.

A study of the fundamentals of organism-environment interaction through the lens of defining and measuring abiotic factors including solar radiation, temperature, atmospheric moisture, Salinity, wind, and currents. On-site exploration of the dynamics of meteorology and the role of abiotic factors in the life of coastal and marine plants and animals including humans.

**BIOSM 329 Ecology of Animal Behavior** (also BIONB 329)

Summer. 4 credits. Prerequisite: 1 year of introductory college biology. Recommended: course work in ecology, psychology, or behavior. S-U grades optional. A special two-week course offered at Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Stimson Hall. Daily lecs, labs, and fieldwork for two weeks. SML faculty.

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 364 Field Marine Science (FMS)**

Summer. 6 credits. Prerequisite: 1 year of college biology. S-U grades optional. A special four-week course offered twice each summer at Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. Students may not take FMS after taking FMBE (BIOSM 375). For more details or an application, consult the SML Office, G14 Stimson Hall. Daily lecs, labs, and fieldwork for 4 weeks. Open to core faculty members assisted by up to 15 visiting lecturers, including representatives of governmental agencies. SML faculty.

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 introductions to physical and chemical oceanography and marine geology. Marine ecology and the effects of human activity on the marine environment are included. Students apply this knowledge by conducting a research project and the end of the course.

FMBE places an emphasis on ichthyology, fisheries biology, general oceanography (biological, physical, and chemical), and marine geology. FMBE (BIOSM 375) places an additional emphasis on ecology, especially in the intertidal zone; ecological, evolutionary, and physiological adaptations of marine organisms; and field experiments.

BIOSM 365 Underwater Research
Summer. 4 credits. Prerequisites: 1 year of college-level biology, recognized scuba certification, and a medical examination. Prerequisite 2-1 grades optional. A special 2-week course offered at Shools Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Simson Hall. Daily lecs and fieldwork for 2 weeks. Team-taught by three faculty members with occasional guest lecturers. Not for recreational divers.

Course covers the philosophy of research, hypothesis testing and experimental design, sampling methods, various underwater techniques, diving physics and physiology, and use of dive tables. Emphasis is on subtidal ecological research. Requirements include completion of critical evaluation of several journal articles and production of a research proposal.

BIOSM 374 Field Ornithology
Summer. 4 credits. Prerequisite: 1 year of college-level biology. S-U grades optional. A special 2-week course offered at Shools Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Simson Hall. Daily lecs and fieldwork for 2 weeks. SML staff.

An introduction to field ornithology focusing on the biology, ecology, and behavior of the avifauna on the Isles of Shoals. The course 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 375 Field Marine Biology and Ecology (FMBE)
Summer. 6 credits. Prerequisites: 1 full year of college-level biology. S-U grades optional. A 4-week course offered at Shools Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML Office, G-14 Simson Hall. Daily lecs, labs, and fieldwork for 4 weeks. SML faculty. Designed for students seeking an introduction to the marine sciences and marine ecology; FMBE emphasizes fieldwork in natural habitats. Examines aspects of the biology and ecology of marine organisms, including intertidal plants and invertebrates, fishes, marine mammals and birds, biological oceanography, and human impacts on the marine environment. FMBE places a special emphasis on the ecology of the intertidal zone and ecological, evolutionary, and physiological adaptations of marine organisms. Students may take FMBE after taking FMS (BIOSM 364).

BIOSM 376 Marine Invertebrate Zoology
Summer. 6 credits. Prerequisite: 1 year of introductory biology and permission of instructors. Students may not take BIOSM 376 after taking BIOSM 375. S-U grades optional. A special 3-week course offered at Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Simson Hall. Daily lecs, labs, and fieldwork for 3 weeks. Offered alternate years. SML faculty.

An introduction to the biology and evolution of the major invertebrate phyla, concentrating on marine representatives. Emphasis is placed on the evolution of form and function, and the ecology, behavior, physiology, chemical ecology, and natural history of invertebrates. Applecore Island’s unique location provides an excellent venue for the study of freshly collected and in situ representatives of most of the major phyla.

BIOSM 402 Marine Pollution
Summer. 4 credits. Prerequisites: 1 year of college-level biology and chemistry or permission of instructor. S-U grades optional. A special 2-week course offered at Shools Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Simson Hall. Daily lecs, labs, and fieldwork for 2 weeks. Offered alternate years. Not offered 2005. SML faculty.

An introduction to marine pollutants; their sources and control/treatment; the effects of marine pollution upon coastal ecosystems; and federal and state water pollution regulations. Laboratory includes training in field collection of water samples, measurement and modeling of effluent plume dispersion, and measurement of microbial indicators of water quality, dissolved oxygen, and toxicity.

BIOSM 413 Research in Marine Biology
Summer. 6 credits. Prerequisite: 1 year of college-level biology; experience in ecology or physiology recommended. S-U grades optional. A special 3-week course offered at Shools Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Simson Hall. Daily lecs, labs, and fieldwork for 3 weeks. Offered alternate years. Not offered 2005. SML faculty.

An introduction to the physiological ecology and functional morphology of marine plants and animals, with emphasis on selected algal and invertebrate examples from the Gulf of Maine. Topics covered include photosynthesis in the marine environment, respiration in invertebrate organisms; carbohydrates, proteins, and lipids as nutrients in the sea; acclimation and adaptation of ice and cold-water habitats; and biological responses to competition and grazing. Field-level laboratory exercises explore principles and procedures used to characterize the physical, chemical, and biotic environment of intertidal and shallow subtidal organisms, including determination of temperature, light, salinity, oxygen and nutrient levels, and in situ functional analyses of metabolic phenomena. The process of scientific investigation is the predominant theme of the course.

BIOSM 418 Tropical Marine Science
Summer. 6 credits. Limited to 15 students. Prerequisites: Recognized scuba certification, a medical examination, and permission of instructor. A special 4-week course offered in Akumal, Mexico. For more details, contact Shoals Marine Laboratory, 141 Simson Hall, 525-3717. A course designed for students interested in learning about coral reef ecology and conservation in an environment where these topics are of immediate concern. Students will spend four weeks in Akumal, Mexico, a small resort town located about 60 miles south of Cancun on the Yucatan Peninsula. Housing will be provided by the Centro Ecologico Akumal, a local organization dedicated to the sustainable development of Akumal and the protection of its coral reefs. The major component of the course will be spent studying basic coral reef ecology and learning the benthic fauna of the local reefs. During the remainder of the course, students will participate in a reef-monitoring research project that will aid in the establishment of a marine park in Akumal. Akumal is a developing center for research in coral reef biology and ecology. TMS students will have the opportunity to interact with the scientists involved in this research.

BIOSM 449 Seaweeds, Plankton and Seagrass: the Ecology and Systematics of Marine Plants
Summer. 4 credits. Prerequisite: BIOSM 364 or 1 year of introductory biology. S-U grades optional. A special 2-week course offered at Shools Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Simson Hall. Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.

An overview of the major marine algal groups, including aspects of anatomy, morphology, development, life histories, physiology, and use. Laboratories and fieldwork emphasize relationships between environment and marine environmental parameters and involve student projects.

EAS 475 Special Topics in Oceanography: Satellite Remote Sensing in Biological Oceanography
Summer. 6 credits. Prerequisites: 1 course in oceanography and or marine biology, or permission of the instructor. Strong computer skills are desired. S-U grades optional. A special 4-week course offered at Shools Marine Laboratory (SML) on an island off Portsmouth, N.H., and on campus at Cornell University. For more details or an application, consult the SML office, G14 Simson Hall. Daily lecs, labs, and fieldwork for 4 weeks. Offered alternate years. Not offered 2005. SML faculty.

“Remote Sensing” provides hands-on research experience in hydrologic optics and satellite remote sensing to advanced undergraduate and beginning graduate students. The course is comprised of two parts, each taught by a separate team of instructors at two different locations: Part I (nine days) will be conducted at Shoals Marine Laboratory and aboard the RV Kingbury in waters surrounding the Isles of Shoals. Part I will be devoted to the theory and measurement of seawater optical properties, emphasizing the dependency of apparent optical property on chlorophyll and dissolved organic matter.
concentrations. Parts 2-4 (19 days) will be conducted at the Science of Earth Systems’ computer laboratory on the Cornell campus. Part 2 will cover satellite remote sensing of the apparent optical properties of seawater with an emphasis on processing SeaWiFS data using SeaDAS software and IDL programming language. Part 3 addresses satellite remote sensing of physical oceanographic processes that influence ecosystem dynamics with an emphasis on AVHRR-derived sea-surface temperature and SST/derived ocean winds. Part 4 is devoted to independent projects: student will attempt to integrate SeaWiFS, AVHRR, and SST/ data to address questions of biogeochemical interactions.

**BIOSM 477 Marine Vertebrates**
Summer. 6 credits. Prerequisites: A course in vertebrate biology. S-U grades optional. A special 3-week course offered at Shools Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Simson Hall. Daily lectures, labs, and fieldwork for 3 weeks. SML faculty. Topics in marine vertebrate biology emphasizing laboratory studies, field collections or observations, and readings from the current literature. Topics covered include systematics of fishes of the Gulf of Maine; elasmobranch physiology; interpretation of life history and parameters from otolith microstructure; teleost skeleton and musculature; 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 495 Research Methods in Marine Biology**
Summer. 1 credit. Prerequisite: concurrent enrollment in BIOSM 499, or permission of instructor. Primarily for undergraduates. A special 8-week course offered at Shools Marine Laboratory (SML). For more details or an application, consult the SML office, G14 Simson Hall. Weekly seminars for 8 weeks. J. G. Morin and M. J. Shulman. 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 499.

**BIOSM 499 Research in Biology**
Summer. Credits variable (2 credits/7 days on site). For more details and an application, consult the SML Office, G14 Simson Hall.

**EAS 213 Marine and Coastal Geology**
Summer. 4 credits. Prerequisite: an introductory course in geology or ecology or permission of instructor. A special 2-week course offered at Shools Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Simson Hall. Daily lectures and fieldwork for 2 weeks. SML faculty. This course examines the geology of the Isles of Shoals from Paleozoic intrusion, deformation, and metamorphism to recent glaciation, sea-level change and wave erosion. Students learn basic surveying and mapping techniques using the Brunton compass, pop-level/stadia rod, autolevel, GPS, scissor and side-scan sonar, and ocean coring, dredging, and grab sampling. Comparisons and inferences between land and sea studies yield thematic maps depicting topography, bedrock geology and structure, vegetation, and land use. From these, ecological characteristics, habitat definition and occupation of habitat by organisms is also examined. This course is appropriate for students of geology, environmental science, ecology, biology, and coastal zone management.

**BIOM 650 Field Marine Ecology and Environmental Science for Teachers**
Summer. 2 credits. Prerequisites: One year of college-level biology; teaching experience recommended. A special 1-week course offered at Shools Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Simson Hall. Daily lectures and fieldwork for one week. SML faculty. Intended for grades 6-12 teachers but also open to undergraduate junior and senior students interested in teaching. Teachers will develop hands-on, experiential approaches to the marine sciences, with an emphasis on coastal and environmental issues. Extensions to freshwater ecology also will be included. Fieldwork is emphasized, with numerous excursions to the rocky intertidal and with offshore ocean studies. Lectures will focus on biodiversity, adaptations, predator-prey interactions, environmental sustainability, and how to engage and motivate students with aquatic projects.

**BIOM 699 Research in Biology for Teachers**
Summer. 2 credits per week. Prerequisite: previous enrollment in BIOM 650. A special course offered at Shools Marine Laboratory on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Simson Hall. An opportunity for teachers who have taken BIOM 650 to return to Shools to pursue more indepth a topic of their choosing under the direction of the BIOM 650 faculty.

**EAS 213 Marine and Coastal Geology**
Summertime. 2 credits. Prerequisite: an introductory course in geology or ecology or permission of instructor. A special 2-week course offered at Shools Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Simson Hall. Daily lectures and fieldwork for 2 weeks. SML faculty. This course examines the geology of the Isles of Shoals from Paleozoic intrusion, deformation, and metamorphism to recent glaciation, sea-level change and wave erosion. Students learn basic surveying and mapping techniques using the Brunton compass, pop-level/stadia rod, autolevel, GPS, scissor and side-scan sonar, and ocean coring, dredging, and grab sampling. Comparisons and inferences between land and sea studies yield thematic maps depicting topography, bedrock geology and structure, vegetation, and land use. From these, ecological characteristics, habitat definition and occupation of habitat by organisms is also examined. This course is appropriate for students of geology, environmental science, ecology, biology, and coastal zone management.

**BIOM 650**
**Molecular Plant Virology (also PL PA 606)**
Spring. 1 credit. S-U grades optional. Prerequisites: BIOM 469 (Principles of Virology), BIOM 499, or a course in cell biology, or permission of instructor. Lect, M W 11:15 (7 wks, 1st half of semester). Offered alternate years. S. G. Lazarowitz. Introduces students to the molecular biology of plant virus replication and interactions with the host to produce disease. Material covered includes virus replication strategies, cell-to-cell and systemic movement, host defense responses and virus counterstrategies, and engineered resistance.

**BIOM 651**
**Genomics of Bacterium-Host Interaction** (also PL PA 609)
Fall. 1 credit. S-U grades optional. Prerequisites: BIOM 290 or equivalent or permission of instructor. Lect, M W 9:05 (2nd half of semester). Offered alternate years. A. Collmer and S. Winans. 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 tool (pathway tools): Yersinia pestis, V. enterocolitica, Pseudomonas syringae, Rabdosia solanacearum, and Agrobacterium tumefaciens and the symbiont Sinorhizobium meliloti.

**NTRES 306 Coastal and Oceanic Law and Policy**
Summer. 2 credits. A special 1-week course offered at Shools Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G14 Simson Hall. Daily lectures and disc for 1 week. SML faculty. Intended for people interested in careers in management of marine or coastal resources or in the natural sciences. Subjects include law and policy related to ocean dumping, marine sanctuaries, environmental impact statements, water and air pollution, fisheries management, offshore gas and oil production, and territorial jurisdiction. Lectures on the status and history of law are accompanied by discussion of relevant policy and analysis of the efficacy of various legal tools. Lectures on policy related to ocean dumping etc. Lectures are by Robert C. Seamans or the SSV Corwith.

**BIOM 366-372**
**SEA Semester**
In cooperation with the Sea Education Association (SEA), the Shools Marine Laboratory offers a semester-length sequence of courses designed to provide college undergraduates with a thorough academic, scientific, and practical understanding of the sea. This sequence is repeated approximately once every two months throughout the year. Students spend the first half of SEA Semester (a six-week shore component) in Woods Hole, Mass., receiving instruction in oceanography, nautical science, and maritime studies. The second half of SEA Semester (a six-week sea component) is spent at sea aboard the SSV Robert C. Seamans or the SSV Corwith. 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 the Shoals Marine Laboratory office, G14 Stimson Hall, or call SEA directly at 800-552-3633. Program costs are to be paid in place of regular Cornell tuition and fees: tuition for the entire 17-credit SEA Semester, approximately $17,000, includes room and board at SEA.

Instructors for the SEA Semester include faculty of the Sea Education Association and the Woods Hole Oceanographic Institution and others.

**Shore Component (six weeks)**

**BIOSM 366 SEA Introduction to Oceanography**
3 credits. Prerequisite: concurrent enrollment in BIOSM 367 and 368. A survey of the characteristics and processes of the global ocean. Oceanographic concepts are introduced and developed 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 367 SEA Introduction to Maritime Studies**
3 credits. Prerequisite: concurrent enrollment in BIOSM 366 and 368. An 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 368 SEA Introduction to Nautical Science**
3 credits. Prerequisites: concurrent enrollment in BIOSM 366 and 367. An introduction to the technologies of operation at sea. The concepts of navigation (piloting, celestial and electronic), naval architecture, ship construction, marine engineering systems, and the physics of sail are taught from their bases in astronomy, mathematics, and physics. Provides the theoretical foundation for the navigation, seamanship, and engineering that students employ at sea.

**Sea Component (six weeks)**

Courses 369, 370, and 372 take place aboard the SSV Robert C. Seamans, a 134-foot steel auxiliary-powered brigantine schooner built in 2001, or the SSV Coraline Cramer, a 134-foot steel auxiliary-powered brigantine built in 1987 for SEA. Both ships normally put to sea with a ship’s company of 34. The professional staff of nine includes the captain, the chief scientist, three science watch officers, three deck watch officers, an engineer, and a steward. In addition, one or more visiting investigators are frequently aboard. Up to 24 students round out the complement.

**BIOSM 369 SEA Practical Oceanography I**
4 credits. Prerequisite: BIOSM 366. Theories and problems raised in the shore component are tested in the practice of oceanography at sea. During lectures and watch standing, students are instructed in the operation of basic oceanographic equipment, in the methodologies involved in the collection, reduction, and analysis of oceanographic data; and in the attendant operations of a sailing oceanographic research vessel.

**BIOSM 370 SEA Practical Oceanography II**
4 credits. Prerequisites: BIOSM 369 and 369. 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 for 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.

**BIOSM 372 SEA Practical Oceanography III**
Summer. 3 credits. Prerequisites: BIOSM 366, 367, and 368. Theories and problems raised in class are tested in the practice of oceanography at sea. During lectures and watch standing, students are instructed in the operation of basic oceanographic equipment, in the methodologies involved in the collection, analysis, and reduction of oceanographic data; and in the attendant operations of a sailing oceanographic research vessel. Group research projects are completed.

**FACULTY ROSTER**

**New York State College of Agriculture and Life Sciences**

Adler, Kraig K., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior
Alani, Eric E., Ph.D., Harvard U. Assoc. Prof., Molecular Biology and Genetics
Anderson, John M., Ph.D., New York U. Prof., Emeritus, Molecular Biology and Genetics
Angert, Esther R., Ph.D., Indiana U. Asst. Prof., Microbiology
Bates, David M., Ph.D., U. of California at Los Angeles. Prof., Plant Biology (Bailey Hortorum)
Brus, Peter J., Ph.D., U. of Illinois. Prof., Emeritus, Molecular Biology and Genetics
Cade, Thomas J., Ph.D., U. of California at Los Angeles. Prof., Emeritus, Ecology and Evolutionary Biology
Carlo, Joseph M., Ph.D., Washington State U. William T. Keeton Professor in Biological Sciences, Molecular Biology and Genetics
Chabot, Brian F., Ph.D., Duke U. Prof., Emeritus, Molecular Biology and Genetics
Clayton, Roderick K., Ph.D., California Inst. of Technology. Prof., Emeritus, Plant Biology
Crepet, William L., Ph.D., Yale U. Prof., Plant Biology (Bailey Hortorum)*
Davies, Peter J., Ph.D., U. of Reading. Prof., Plant Biology
Dhondt, Andre A., Ph.D., Ghent State U. (Belgium). Edwin H. Morgens Professor of Ornithology, Ecology and Evolutionary Biology/Laboratory of Ornithology
Dodd, John W., Ph.D., Cornell U. Prof., Emeritus, Microbiology
Doyle, Jeffrey J., Ph.D., Indiana U. Prof., Plant Biology (Bailey Hortorum)
Dress, William J., Ph.D., Cornell U. Prof., Emeritus, Plant Biology (Bailey Hortorum)
Dri, Paul L., Ph.D., Harvard U. Jacob Gould Schurman Professor, Neurobiology and Behavior
Elmen, Stephen T., Ph.D., U. of Michigan. Jacob Gould Schurman Professor, Neurobiology and Behavior
Fitzpatrick, John W., Ph.D., Princeton U. Prof., Ecology and Evolutionary Biology/Laboratory of Ornithology
Flecker, Alexander S., Ph.D., U. of Maryland. Assoc. Prof., Ecology and Evolutionary Biology
Fox, Thomas D., Ph.D., Harvard U. Prof., Molecular Biology and Genetics
Fu, Jianguo, Ph.D., U. of Pittsburgh. Asst. Prof., Molecular Biology and Genetics
Ghiorse, William C., Ph.D., Rensselaer Polytechnic Inst. Prof., Microbiology
Goldberg, Michael L., Ph.D., Stanford U. Prof., Molecular Biology and Genetics
Hanson, Maureen R., Ph.D., Harvard U. Prof., Molecular Biology and Genetics/Liberty Hyde, Prof., Plant Biology
Harrison, Richard G., Ph.D., Cornell U. Prof., Ecology and Evolutionary Biology
Harris-Warrick, Ronald M., Ph.D., Stanford U. Prof., Neurobiology and Behavior
Harvell, C. Drew, Ph.D., U. of Washington. Prof., Ecology and Evolutionary Biology
Hay, Anthony, Ph.D., U. of California. Asst. Prof., Microbiology
Helmann, John D., Ph.D., U. of California at Berkeley. Prof., Microbiology
Henry, Susan, Ph.D., U. of California Berkeley. Prof., Molecular Biology and Genetics and Dean CALS
Hopkins, Carl D., Ph.D., Rockefeller U. Prof., Neurobiology and Behavior
Howarth, Robert W., Ph.D., Massachusetts Inst. of Technology. Prof., Emeritus, Oceanographic Institution. David R. Atkinson Professor in Ecology and Environmental Biology
Hua, Jian, Ph.D., California Inst. Of Technology. Asst. Prof., Biology
Ingram, John W., Ph.D., U. of California at Berkeley. Prof., Emeritus, Plant Biology (Bailey Hortorum)
Iagudin, Andre T., Ph.D., Yale U. Libby Bailey Professor of Plant Physiology
Jagendorf, Arthur T., Ph.D., U. of California Berkeley. Prof., Emeritus, Plant Biology (Bailey Hortorum)
Kempf, Kenneth J., Ph.D., Indiana U. Prof., Molecular Biology and Genetics
Kessler, Andre, Ph.D., U. of Jena (Germany). Asst. Prof., Ecology and Evolutionary Biology
Kingsbury, John M., Ph.D., Harvard U. Prof., Emeritus, Plant Biology
Kraus, W. Lee, Ph.D., U. of Illinois. Asst. Prof., Molecular Biology and Genetics
Lis, John T., Ph.D., Brandeis U. Prof., Molecular Biology and Genetics
Lowte, Irby J., Ph.D., U. of Pennsylvania. Asst. Prof., Ecology and Evolutionary Biology
Mackay, John T., Ph.D., U. of Texas at Austin. Assoc. Prof., Plant Biology (Bailey Hortorum)
MacDonald, Russell E., Ph.D., U. of Michigan. Prof., Emeritus, Molecular Biology and Genetics
MacIntyre, Ross J., Ph.D., Johns Hopkins U. Prof., Molecular Biology and Genetics
Johnson, Bruce R., Ph.D., Boston U. Sr.
Catalfamo, James, M.S., Ph.D., Union College.
Beyenbach, Klaus W., Ph.D., Washington State
Likens, Gene E., Adjunct Prof., Institute
Levin, Simon A., Adjunct Prof., Princeton U./
Joint Appointees
Eberhard, Carolyn, Ph.D., Boston U. Sr.
Other Teaching Personnel
Zamudio, Kelly R., Ph.D., U. of Washington.
Wolfner, Mariana F., Ph.D., Stanford U. Prof.,
Wilson, David B., Ph.D., Stanford U. Prof.,
Whitlock, Kathleen E., Ph.D., U. Washington
Seattle. Asst. Prof., Molecular Biology and Genetics
Wilson, David B., Ph.D., Stanford U. Prof.,
Biochemistry, Molecular Biology and Genetics
Wolfer, Mariana F., Ph.D., Stanford U. Prof.,
Molecular Biology and Genetics
Asst. Prof., Ecology and Evolutionary Biology
Other Teaching Personnel
Eberhard, Carolyn, Ph.D., Boston U. Sr.
Lecturer, Plant Biology
Johnson, Bruce R., Ph.D., Boston U. Sr.
Lecturer, 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
Beyenbach, Klaus W., Ph.D., Washington State U. Prof., Biomedical Sciences
Cattallo, James, M.S., Ph.D., Union College.
Sr. Res. Assoc., Population Medicine and Diagnostic Services
Farnum, Cornelia E., D.V.M., Ph.D., U. of Wisconsin-Madison. Prof., Biomedical Sciences
Fortune, Joanne E., Ph.D., Cornell U. Prof., Biomedical Sciences
Gilmour, Robert F., Ph.D., SUNY Upstate Medical Center. Prof., Biomedical Sciences
Gleed, Robin, BVSc, MRCVS, Univ. Liverpool, England. Assoc. Prof., Clinical Sciences
Gunn, Teresa M., Ph.D., U. of British Columbia. Asst. Prof., Biomedical Sciences
Hermanson, John W., M.S., Ph.D., U. of Florida Gainesville. Assoc. Prof., Biomedical Sciences
Hopty, Katherine A., V.M.D., Ph.D., U. of Pennsylvania. Prof., Clinical Sciences
Kotlikoff, Michael L., Ph.D., U. of California at Davis. Prof., Biomedical Sciences
Lin, David, Ph.D., U. of California at Berkeley. Asst. Prof., Biomedical Sciences
Loew, Ellis R., Ph.D., U. of California at Los Angeles. Prof., Biomedical Sciences
Lorz, Nancy, Ph.D., U. Oregon. Lecturer, Biomedical Sciences
Ludders, John, D.V.M., Washington State U. Prof., Clinical Sciences
Mizer, Linda, D.V.M., Ph.D., The Ohio State. Senior Lecturer, Biomedical Sciences
Nikitin, Alexander Yu, M.D., Ph.D., Petrov Research Institute of Oncology (Russia). Asst. Prof. of Pathology, Biomedical Sciences
Norden, Drew W., Ph.D., Washington U. (St. Louis). Prof., Biomedical Sciences
Oswald, Robert, Ph.D., Vanderbilt U. Prof., Molecular Medicine
Quarioni, Andrea, Ph.D., U. of Pavia (Italy). Prof., Biomedical Sciences
Rawson, Richard E., D.V.M., Ph.D., U. of California at Berkeley. Prof., Biomedical Sciences
Robinson, Mark, Ph.D., U. of Nebraska. Assoc. Prof., Biomedical Sciences
Sacco, Tyson, Ph.D., U. of California at Los Angeles. Lecturer, Biomedical Sciences
Schlafer, Donald H., D.V.M., Ph.D., U. of Georgia. Prof., Biomedical Sciences
Suarez, Susan, Ph.D., U. Virginia. Prof., Biomedical Sciences
Travis, Alexander J., V.M.D., Ph.D., U. of Pennsylvania. Asst. Prof., Biomedical Sciences
Weiss, Robert S., Ph.D., Baylor College of Medicine. Asst. Prof., Biomedical Sciences
Wootton, John F., M.S., Ph.D., Cornell U. Prof., Biomedical Sciences
Yen, Andrew, Ph.D., Cornell University. Professor of Pathology and Director of Graduate Studies in Environmental Toxicology, Biomedical Sciences

College of Engineering
Joint Appointees
Cisne, John L., Assoc. Prof., Geological Sciences/Biological Sciences
Dale, W., Prof., Applied and Engineering Physics/Biological Sciences

Biological Sciences
Joint Appointees
Snedeker, Suzanne M., Asst. Prof., Center for the Environment/Biological Sciences

Division of Nutritional Sciences
Joint Appointees
Arion, William J., Prof., Nutritional Sciences/ Molecular Biology and Genetics
Bensadoun, Andre, Prof., Nutritional Sciences/Physiology
Kazarinoff, Michael N., Assoc. Prof., Nutritional Sciences/Molecular Biology and Genetics

*Joint appointment with the College of Arts and Sciences.
$Joint appointment with the College of Veterinary Medicine.
$tJoint appointment with the College of Agriculture and Life Sciences.
$tJoint appointment with the College of Engineering.
Computing and Information Science

Faculty of Computing and Information Science

Robert L. Constable, Dean for Computing and Information Science
John Ahowd, Industrial and Labor Relations
William Arms, Computer Science
Graeme Bailey, Computer Science
Kavita Bala, Computer Science
Kenneth Birman, Computer Science
Claire Cardie, Computer Science
Richard Caruana, Computer Science
Thomas Coleman, Computer Science
Alan Demers, Computer Science
Ron Elber, Computer Science
Keshav Pingali, Computer Science
Jon Kleinberg, Computer Science
Andrew Pershing, Earth and Atmospheric Sciences
Daniel Huttenlocher, Computer Science
Thorsten Joachims, Computer Science
Jon Kleinberg, Computer Science
Dexter Kozen, Computer Science
Lillian Lee, Computer Science
Hod Lipson, Mechanical and Aerospace Engineering
Steve Marschner, Computer Science
N. David Mermin, Physics
Andrew Myers, Computer Science
Andrew Pershing, Earth and Atmospheric Sciences
Keshav Pingali, Computer Science
Stephen Pope, Mechanical and Aerospace Engineering
Mats Rooth, Linguistics
Rado Ruginia, Computer Science
Fred Schneider, Computer Science
David Schwartz, Computer Science
Bart Selman, Computer Science
Phoebe Sengers, Science and Technology Studies
David Shalloway, Molecular Biology and Genetics
Jayavel Shanmugasundaram, Computer Science
David Shmoys, Computer Science, Operations Research and Industrial Engineering
Christine A. Shoemaker, Civil and Environmental Engineering
Gun Sirer, Computer Science
Buzz Spector, Art
Eva Tardos, Computer Science
Tim Teitelbaum, Computer Science
William Thurston, Mathematics, CIS
Ken Torrance, Mechanical and Aerospace Engineering
Charles Van Loan, Computer Science
Stephen Yavasiss, Computer Science
David P. Williamson, Operations Research and Industrial Engineering, CIS
Golan Yona, Computer Science
Raman Zabih, Computer Science

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 and interdisciplinary programs in computational biology, computational science and engineering, digital arts and graphics, and information science. The faculty 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 their 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.

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. CIS sponsors several "tool-based" short courses for students who anticipate that their studies will have a strong computational component (CIS 401, 402, 403, 404). A course on data structures for computational science (CIS 409) is also offered.

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 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, compilers, computing systems, artificial intelligence, natural language processing, computer graphics, computer vision, databases, networks, bioinformatics, the theory of algorithms, scientific computing, and computational logic.

The Department of Computer Science offers the computer science major to students in the College of Engineering, the computer science minor to students in the College of Engineering, and the master of engineering (M.Eng.) degree in computer science to students in the College of Engineering.

Digital Arts and Graphics
CIS is working to develop undergraduate and graduate research programs and curricula in the digital arts and graphics. Several courses already exist in this area (ART 372, ART 391, CIS 365, COM S 465, 467, 468; MUSIC 120). More courses in this growing field are planned for the near future.

Information Science
Information science at Cornell is an interdisciplinary program that 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
THE INFORMATION SCIENCE CONCENTRATION/MINOR

A concentration/minor in information science is available to students in the Colleges of Agriculture and Life Sciences (CALS), Architecture, Art, and Planning (AAP); available to Architecture, Art, and Planning students), Arts and Sciences; Engineering; and Human Ecology; and the Schools of Hotel Administration and Industrial and Labor Relations (ILR). Because of small differences in regulations between the colleges, there are sometimes slight variations in the requirements, depending on a student's college and, in a few cases, a student's major. All students interested in pursuing the information science concentration/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 infosci-minor@cs.cornell.edu. Students are also referred to www.infosci.cornell.edu/ugrad/concentration.html for the most up-to-date description of the concentration and its requirements.

Information science is an interdisciplinary field covering all aspects of digital information. The program has three main areas: human-centered systems, social systems, and information systems. Human-centered systems studies the relationship between humans and information, drawing from human-computer interaction and cognitive science. Social systems examines information in its economic, legal, political, cultural, and social contexts. Information systems studies the computer science problems of representing, storing, manipulating, and using digital information.

The concentration/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 concentration/minor are as follows. All courses must be chosen from the course lists below. In addition, a letter grade of C or better is required. S-U courses are not allowed.

- **Statistics**: one course.
- **Human-centered systems** (human-computer interaction and cognitive science): two courses (for all colleges except Engineering); one course (Engineering).
- **Social systems** (social, economic, political, cultural, and legal issues): one course.
- **Information systems** (primarily computer science): two courses.
- **Elective**: one additional course from any component area. (Engineering students and all Computer science majors must select a course from human-centered systems or social systems. Communication majors must select a course outside Communication. Students in other majors should check with their advisers to make sure there are no special departmental restrictions or requirements.)

### Statistics

An introductory course that provides a working knowledge of basic probability and statistics and their application to analyzing data occurring in the real world. Engineering students must take one of the following:

- **ENGRD 270 Basic Engineering Probability and Statistics**
- **CEE 304 Uncertainty Analysis in Engineering**
- **ECE 310 Introduction to Probability and Random Signals**

All other students can meet this requirement with any one of the following:

- **MATH 171 Statistical Theory and Application in the Real World**
- **11 ADM 201 Operations Management**
- **PAM 210 Introduction to Statistics**
- **PSYCH 261 Statistical Methods I (also STAT 261)**
- **ENGRD 270 Basic Engineering Probability and Statistics**
- **GIS 295 Mathematical Models for Information Science**
- **CEE 304 Uncertainty Analysis in Engineering**
- **ECE 310 Introduction to Probability and Random Signals**

### Social Systems

- **COGST 101 Introduction to Cognitive Science**
- **PSYCH 205 Perception**
- **INFO 214 Cognitive Psychology**
- **COMM 240 Communication and Information Technology**
- **INFO 245 Psychology of Social Computing**
- **PSYCH 280 Introduction to Social Psychology**
- **PSYCH 342 Human Perception: Applications to Computer Graphics, Art, and Visual Display**
- **INFO 345 Human-Computer Interaction Design**
- **PSYCH 347 Psychology of Visual Communications**
- **PSYCH 380 Social Cognition**
- **PSYCH 413 Information Processing: Conscious and Unconscious**
- **PSYCH 416 Modeling Perception and Cognition**
- **INFO 440 Advanced Human-Computer Interaction Design**
- **INFO 450 Language and Technology**
- **DEA 470 Applied Ergonomics Methods**

### Human-Centered Systems

- **INFO 355 Computers: From Babbage to Gates**
- **ECON 319 Economic Decisions Under Uncertainty**
- **COMM 428 Communication Law**
- **ORIE 435 Introduction to Game Theory**
- **STS 338 Media and Critical Studies of Computation**
- **PSYCH 350 Statistics and Research Design**
- **PSYCH 351 Introduction to Statistics and Probability**
- **PSYCH 352 Applied Regression Methods**
- **PSYCH 353 Psychological Measurement**
- **PSYCH 354 Statistics and Research Design**
- **PSYCH 355 Computer Applications in Psychology**
- **PSYCH 356 Technology and Social Behavior**
- **PSYCH 357 Psychology of Visual Communications**
- **PSYCH 358 Social Cognition**
- **PSYCH 359 Information Processing: Conscious and Unconscious**
- **PSYCH 360 Modeling Perception and Cognition**
- **INFO 440 Advanced Human-Computer Interaction Design**
- **INFO 450 Language and Technology**
- **DEA 470 Applied Ergonomics Methods**
COMPUTING AND INFORMATION SCIENCE (CIS) - 2004-2005

- ECON 476/477 Decision Theory I and II
- INFO 515 Culture, Law, and Politics of the Internet
*Only one of ECON 301 and ECON 313 can be taken for IS credit. Only one of OR&E 435 and ECON 368 can be taken for IS credit.

Information Systems
- INFO 130 Introductory Design and Programming for the Web*
- COM S 211 Computers and Programming*
- INFO 230 Intermediate Design and Programming for the Web*
- INFO 330 Applied Database Systems
- LING 424 Computational Linguistics
- COM S 465 Computer Graphics I
- COM S 432 Introduction to Database Systems
- OR&E 474 Statistical Data Mining
- OR&E 480 Information Technology
- COM S 501 Software Engineering
- ECE 562 Fundamental Information Theory
- COM S 578 Empirical Methods in Machine Learning and Data Mining
*INFO 150 cannot be taken for information science credit by Engineering students. Computer science majors cannot use INFO 130 or INFO 230. COM S 211 cannot be taken for information science credit by majors for which it is a required course, e.g., Computer Science (COM S) and Operations Research and Industrial Engineering (OR&E).

COMPUTING AND INFORMATION SCIENCE (CIS) COURSES

CIS 121 Introduction to MATLAB (also EAS 121)
Fall, spring. 2 credits. Corequisite: MATH 111, 191, or equivalent.
An 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. The course assumes no programming experience.

CIS 122 Application of FORTRAN in the Earth and Environmental Sciences (also EAS 150)
Spring, 2 credits. Prerequisite: CIS/EAS 121 or equivalent.
For description, see EAS 150.

CIS 165 Computing in the Arts (also COM S 165, MUSC 165)
Fall; 3 credits.
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. We look at data sets of created things, apart and sampling and ways of putting things together and resynthesising, and we explore ideas for creation. There are no formal course prerequisites (in particular, no courses in programming are assumed, or probability although a good comfort level with computers and some of the arts is helpful. This course does not teach software packages for creating art and music. The course complements ART 171+ and MUSC 120+.

CIS 167 Visual Imaging in the Electronic Age (also COM S 167, ENGR 167)
Spring; 3 credits; S-U grades optional.
The concepts and ideas behind computer imaging and computer graphics, both software and hardware. Topics include perspective representations, display technology, on-line television world, bandwidth concepts, digital photography, computer graphics modeling and rendering, matting and compositing, color perception, data acquisition, and volumetric imaging. Historical precedents, particularly from the art world, are used throughout. Other modes of imaging are discussed, including laser scanning, ultrasound, x-rays, and magnetic resonance, each of which is important to medical practice. This is not a course on how to use a particular graphics imaging program, but rather an explanation of the underlying principles.

CIS 191 Media Arts Studio I (also ART 391, THETR 391)
Fall; 5 credits. Prerequisite: one of the following courses: ART 171, THETR 277, 377, MUSC 120, or equivalent; must be a junior and have permission of the instructor. Lab fee $50.
For description, see ART 391.

CIS 300 Introduction to Computer Game Design
Fall; 4 credits. Prerequisites: for artists, ART 251 and experience with Photoshop and Illustrator or similar software; for musicians, COM S 100, COM S/INFO 130, MUSC 120; for programmers, COM S/INFO 211, COM S 215, or equivalent experience in C++; for writers, COM S 100, COM S/INFO 120, ENGL 280/281.
This course investigates the theory and practice of developing computer games from a blend of technical, aesthetic, and cultural perspectives. Technical issues such as game architecture include software engineering, artificial intelligence, game physics, computer graphics, and networking. Aesthetic and cultural aspects of design include art and modeling, sound and music, history of games, genre analysis, role of violence, gender issues in games, game balance, and careers in the industry. Programmers, artists, musicians, and writers collaborate to produce an original computer game.

CIS 401 Introduction to Applied Scientific Computing with MATLAB
Fall; 1 credit. Usually weeks 2-5. Prerequisite: COM S 100 or equivalent programming experience. S-U grades only.
An introduction to the use of MATLAB as an aid to scientific research. The course introduces the basic syntax and features of MATLAB and develops the background necessary for the user to take specialized courses. The course covers basic MATLAB programming and vectorized operations, data input/output, and simple visualization. The course emphasizes applied issues such as managing large data sets, simulation, and visualization but also introduces fundamental ideas in scientific computing such as floating point arithmetic and algorithm efficiency. Although the course uses MATLAB, the ideas and concepts covered are common to many computational environments.

CIS 402 Scientific Visualization with MATLAB
Fall; 1 credit. Usually weeks 6-10. Prerequisites: COM S 100 or equivalent programming experience; COM S 401/CIS 401 recommended but not required. S-U grades only.
A survey of the advanced visualization features in MATLAB. The course covers MATLAB's "handle graphics" paradigm, specialized graphics routines for vectors and fields, and introduces OpenGL, lighting, and new features for controlling object transparency. Although the course is meant to introduce students to the capabilities of the MATLAB system, it also emphasizes the basic goal of visualization: producing an image that effectively communicates a scientific result.

[CIS 403 Development of Scientific Computing Programs
Spring; 1 credit. Usually weeks 1-4. Prerequisite: COM S 100 or equivalent programming experience. S-U grades only.
This course is designed for graduate students who, in their research, will develop computer programs to solve scientific or engineering problems (e.g., in Fortran, C, or Java). Approaches and tools are presented that facilitate the development of good software. The course emphasizes the tools available, in UNIX and Windows environments. Topics covered include compilers, debuggers, software design, and project management.

[CIS 404 Survey and Use of Software Libraries for Scientific Computing
Spring; 1 credit. Usually weeks 5-8. Prerequisites: COM S 100 or equivalent programming experience; COM S 403/CIS 403 recommended but not required. S-U grades only.
Many software packages and code libraries have been developed for the solution of standard problems in scientific computing. Examples of such libraries are LAPACK, IMSL, Numerical Recipes routines, MATLAB functions, and routines available in online repositories such as Netlib. This course discusses how to link to or compile standard library formats and considers the legal and ethical aspects of using other people's code (or having them use yours). The course also surveys some of the standard problems and the available libraries and discusses the issues that arise in their use (e.g., accuracy, robustness, and generality).

[CIS 409 Data Structures and Algorithms for Computational Science
Fall; 4 credits. Prerequisite: COM S 211 or equivalent programming experience. Not offered every year. Covers data structures and algorithms with emphasis on those useful for computational
CIS 490 Independent Reading and Research
Fall, spring. 1-4 credits. Independent reading and research for undergraduates.

CIS 565 Computer Animation (also ART 372, COM S 565; formerly CIS/COM S 518)
Fall. 4 credits. Prerequisite: COM S/ENGRD 211.
This course introduces students to various advanced animation techniques, including modeling, 2D key cel animation, motion and kinematics, lighting and materials, 3D key frame animation, physically based simulation, special effects, storyboarding, and cinematography. The first half of the course consists of lectures/seminars and some didactic project assignments with supplemental reading assignments. The second half consists of a final project in which students may work in groups to create an original work of computer animation.

CIS 572 Heuristic Methods for Optimization (also CEE 509, COM S 572, OR&IE 533)
Fall. 3 or 4 credits. Prerequisite: COM S/ENGRD 211 or 322, or CEE/ENGRD 241, or graduate standing, or permission of instructor. For description, see CEE 509.

CIS 576 Decision Theory I (also ECON 476, 676)
Fall. 4 credits. Prerequisites: mathematical sophistication.

CIS 577 Decision Theory II (also ECON 477, 677)
Spring. 4 credits. Prerequisites: Mathematical sophistication.

CIS 673 Integration of Artificial Intelligence and Operations Research (also COM S 673)
Spring. 3 credits. For description, see COM S 673.

CIS 750 Evolutionary Computation and Design Automation (also COM S 750, M&AE 650)
Fall. 4 credits. Prerequisite: programming experience or permission of instructor. Not offered every year.

CIS 751 Media Research and Critical Design (also COM S 751)
Fall. 4 credits. Prerequisites: graduate standing in COM S or equivalent ability to read technical research papers. Contact instructor if unsure of qualifications. Not offered every year.

CIS 752 Seminar on Scholarly Information Architecture
Fall. 3 credits. Prerequisite: concurrent enrollment in COM S 451 or equivalent experience. S-U grades only. Not offered every year.

CIS 790 Independent Research
Fall, spring. Variable credit. Prerequisite: permission of a CIS faculty member. Independent research or master of engineering project.

COM S 113 Introduction to C
Fall, spring, 1 credit. Usually weeks 1-4. Prerequisite: COM S 100 or equivalent programming experience. Credit is granted for both COM S 113 and 213 only if 113 is taken first. S-U grades only. A brief introduction to the C programming language and standard libraries. Unix accounts are made available for students wishing to use that system for projects, but familiarity with Unix is not required. Projects may be done using any modern implementation of C. COM S 213 (C++ Programming) includes much of the material covered in 113. Students planning to take COM S 213 normally do not need to take 113.

COM S 114 Unix Tools
Fall. 1 credit. Usually weeks 5-8. Prerequisite: COM S 100 or equivalent programming experience. S-U grades only. An introduction to Unix, emphasizing tools for file management, communication, process control, managing your Unix environment, and rudimentary shell scripts. Knowledge of at least one programming language is encouraged. Projects assume no previous knowledge of Unix or expertise in any particular language.

COM S 130 Introductory Design and Programming for the Web (also INFO 130)
Fall. 3 credits. No prerequisites. The World Wide Web is both a technology and a pervasive and powerful resource in our society and culture. To build functional and effective web sites, students need technical and design skills as well as analytical skills for understanding who is using the web, in what ways they are using it, and for what purposes. In this course students develop skills in all three of these areas through the use of technologies such as XHTML, Cascading StyleSheets, and PHP. Students study how web sites are deployed and used, usability issues on the web, user-centered design, and methods for visual layout and information architecture. Through the web, this course provides an introduction to the interdisciplinary field of information science. No computer background necessary.

COM S 165 Computing in the Arts (also CIS 165, MUSIC 165)
Fall. 3 credits. For description, see CIS 165.

COM S 167 Visual Imaging in the Electronic Age (also CIS 167, ENGR 167)
Spring. 3 credits. S-U grade optional. For description, see CIS 167.

COM S 172 Computation, Information, and Intelligence (also COGST 172 and ENGR 172)
Fall. 3 credits. Prerequisites: some knowledge of differentiation required; permission of instructor required for students who have completed the equivalent of COM S 100. Not offered fall 2004.
An introduction to computer science using methods and examples from the field of artificial intelligence. Topics include game playing, search techniques, learning theory, compute-intensive methods, data mining, information retrieval, the web, natural language processing, and the Turing test. This is not a programming course; rather, "pencil and paper" problem sets will be assigned. Some calculus required.
COM S 201  Cognitive Science in Context Laboratory (also COGST 201 and PSYCH 201) 
Spring, 4 credits. Limited to 24 students. Prerequisite: concurrent or prior registration in Introduction to Cognitive Science (PSYCH 102/COGST 101/COM S 101/LING 170/PHL 191) is suggested but not required. Knowledge of programming language not assumed. Fall, B. Halpern and staff, spring, D. Field and staff. For description, see COGST 201.

COM S 211  Computers and Programming (also ENGRD 211) 
Fall, spring, summer. 3 credits. Prerequisite: COM S 100 or an 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.

COM S 212  Java Practicum 
Fall, spring, summer. 1 credit. Letter grade only. Pre- or corequisite: COM S/ENGRD 211. A 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.

COM S 213  C++ Programming 
Spring, 2 credits. Prerequisite: COM S 100 or equivalent programming experience. Students who plan to take COM S 113 and 213 must take 115 first. S-U grades only. An intermediate level introduction to the C++ programming language and the C/C++ standard libraries. Topics include basic statements, declarations, and types; stream I/O; user defined classes and types; derived classes, inheritance, and object-oriented programming; exceptions and templates. Recommended for students who plan to take advanced courses in computer science that require familiarity with C++ or C. Students planning to take COM S 213 normally do not need to take COM S 113, 213 includes most of the material taught in 113.

COM S 214  Advanced UNIX Programming and Tools 
Spring. 1 credit. S-U grades only. Usually weeks 5-8. Prerequisite: COM S 114 or equivalent. A focus 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 COM S 114 first.

COM S 215  Introduction to C# 
Fall, spring, 1 credit. S-U grades only. Usually weeks 5-8. Prerequisite: COM S/ ENGRD 211 or equivalent experience. Introduces students to building applications in the .NET environment using the C# language.

COM S 230  Intermediate Design and Programming for the Web (also INFO 230) 
Spring. 3 credits. Prerequisite: COM S 130 or equivalent knowledge. Web programming requires the cooperation of two machines: the one in front of the viewer (client) and the one delivering the content (server). COM S 130 concentrates almost exclusively on the client side. The main emphasis in COM S 230 is learning about server side processing. Students begin by looking at interactions with databases, learning about querying both on paper and via SQL. They then work 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 site 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.

COM S 280  Discrete Structures 
Fall, spring. 3 credits. Pre- or corequisite: COM S/ENGRD 211 or permission of instructor. Covers mathematical aspects of programming and computing. Topics are chosen from the following: mathematical induction; logical proof; propositional and predicate calculus; combinators and discrete mathematics covering manipulation of sums, recurrence relations, and function techniques; basic number theory; sets, functions, and relations; partially ordered sets; graphs; and algebraic structures.

COM S 312  Data Structures and Functional Programming 
Fall, spring. 4 credits. Prerequisite: COM S 211/212 or equivalent programming experience. Should not be taken concurrently with COM S 314. An 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 covered are techniques for analyzing program performance and correctness.

COM S 314  Computer Organization (also ECE 314) 
Fall, spring. 4 credits. Prerequisite: COM S 211, COM S 312, or ENGRD 250 or equivalent but not required. Should not be taken concurrently with COM S 312. Basic computer organization. Topics include performance metrics, data formats, instruction sets, addressing modes, computer arithmetic, datapath design, memory hierarchies including caches and virtual memory, I/O devices, and bus-based I/O systems. Students learn assembly language programming and design a simple pipelined processor.

COM S 320  Numerical Methods in Computational Molecular Biology (also BIO BM 321 and ENGRD 321) 
Fall. 3 credits. Prerequisite: concurrent or at least one course in calculus, such as MATH 106, 111, or 191 and a course in linear algebra, such as MATH 221 or 294 or BTRY 417. COM S 100 or equivalent and some familiarity with iteration, arrays, and procedures. Not offered fall 2004. An introduction to numerical computing using MATLAB organized around five applications: the analysis of protein shapes, dynamics, protein folding, score field, and field equations. Students become adept at plotting, linear equation solving, least squares fitting, and cubic spline interpolation. More advanced problem-solving techniques that involve eigenvalue equations are used. The goal of the course is to develop a practical computational expertise with MATLAB and to build intuition for the problems of molecular biology. COM S majors and minors may use only one of the following toward their degree: COM S 321, 322, 421, or 428.

COM S 322  Introduction to Scientific Computation (also ENGRD 322) 
Spring, summer. 3 credits. Prerequisites: COM S 110 and MATH 221 or MATH 294. An introduction to elementary numerical analysis and scientific computation. Topics include interpolation, quadrature, linear and nonlinear equation solving, least-squares fitting, and ordinary differential equations. The MATLAB computing environment is used. Vectorization, efficiency, reliability, and stability are stressed. Includes special lectures on parallel computation. COM S majors and minors may use only one of the following toward their degree: COM S 321, 322, 421, or 428.

COM S 324  Computational Linguistics (also COGST 424, LING 424) 
Fall, spring. 4 credits. Prerequisites: LING 203; labs involve work in the UNIX environment. COM S 114 recommended. For description, see LING 424.

COM S 330  Applied Database Systems (also INFO 330) 
Fall. 3 credits. Prerequisite: COM S 211/ ENGRD 211. COM S majors may use only one of the following toward their degree: COM S/INFO 330 or COM S 433.

The course introduces students to modern database systems and three-tier application development with a focus on building web-based applications using database systems. Concepts covered include the relational model, relational query language, database modeling, normalization, database tuning, three-tier architectures, Internet data formats and query languages, server- and client-side technologies, and an introduction to web services. Students build a database-backed web site.

COM S 381  Introduction to Theory of Computing 
Fall, summer. 3 credits. Prerequisite: COM S 280 or permission of instructor. Credit will not be granted for both COM S 381 and COM S 481. Credit transfers between COM S 381 and COM S 481 (in either direction) are encouraged during the first few weeks of instruction.
An introduction to the modern theory of computing: automata theory, formal languages, and effective computability.

COM S 400 The Science of Programming
Fall. 3 credits. Prerequisite: COM S 211.
Covers the practical development of correct programs based on the conscious application of principles that are derived from a mathematical notion of program correctness. In addition, related ideas in algorithmic problem solving are explored.

COM S 411 Programming Languages
Fall. 4 credits. Prerequisite: COM S 312 or permission of instructor.
An introduction to the specification, 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.

COM S 412 Introduction to Compilers
Spring. 3 credits. Prerequisites: COM S 312 or permission of instructor and COM S 314. Corequisite: COM S 413.
An introduction to the specification and implementation of modern compilers. Topics covered include lexical scanning, parsing, type checking, code generation and translation, an introduction to optimization, and the implementation of modern programming languages. The course entails a substantial compiler implementation project.

COM S 413 Practicum in Compilers
Spring. 2 credits. Corequisite: COM S 412.
A compiler implementation project related to COM S 412.

COM S 414 Systems Programming and Operating Systems
Fall, spring, summer. 5 credits.
Prerequisites: COM S 211, 212, 312 (or permission of instructor) and 314.
Corequisite: COM S 415 in spring only. An 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.

COM S 413 Practicum in Operating Systems
Fall, spring. 2 credits.
Corequisite: COM S 414.
The practical aspects of operating systems are studied 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.

COM S 419 Computer Networks (formerly COM S 519)
Spring. 4 credits. Prerequisite: COM S 211, COM S 312, or ENGRD 230 are recommended but not required, or permission of instructor. Not offered every year.
An introduction to computer networks with an emphasis on evolving Internet standards. A detailed introduction is given to networking protocols for reliable data transfer, flow control, congestion control, naming and addressing, routing, security, management, and applications. Fundamentals of layered protocols and techniques for protocol design and implementation are discussed. The course is project oriented and requires a substantial programming experience in Java or C.

COM S 421 Numerical Analysis
Fall. 4 credits. Prerequisites: MATH 294 or equivalent, and knowledge of programming.
Modern algorithms for solving linear equations, systems of nonlinear equations, numerical optimization, and numerical solution of differential equations. Some discussion of methods suitable for parallel computation. This course requires more mathematical sophistication than COM S 322.
COM S majors and minors may use only one of the following toward their degree: COM S 321, 322, 421, or 428.

COM S 426 Introduction to Computational Biology
Fall. 3 credits. Prerequisites: COM S/ ENGRD 230.
Computational biology is a relatively new field that is rooted in two different disciplines: computer science and molecular biology. It is concerned with the study of biological systems and phenomena in search of explanations, rules, patterns, and regularities. The focus of this course is the set of algorithms, tools, and models used today to analyze biological data and recover and discover hidden information. These tools can be used to predict the function of new genes, discover hidden motifs that are biologically significant, study evolutionary processes, and aid in the development of new therapeutic agents for treatment of various diseases. Some of the topics covered are sequence analysis (alignment, multiple sequence alignment), motif detection, phylogenetic trees, secondary structure prediction, Hidden Markov Models, and analysis of gene expression data.

This course is intended mostly for students in the computational sciences because it focuses on algorithms and mathematical models. No knowledge of biology is needed (the course starts with a brief overview of the basic entities and the central dogma of molecular biology, and other relevant terms are introduced as needed).

COM S 427 Practicum in Computational Biology
Fall. 2 credits. Prerequisite: COM S 426.
In this course, students develop a system or an application to analyze biological data. Possible applications are a database system to manipulate multiple data types, a learning system to detect hidden patterns in massive biological data sets, a suite for sequence comparison or analysis of gene expression data, etc.

COM S 428 Introduction to Computational Biophysics
Fall. 3 credits. Prerequisites: COM S 100, CHEM 211 or equivalent, MATH 293 or 294, PHY 112 or 213, or permission of instructor. BIO/BIOS 330 recommended.
This course teaches the techniques that are used to simulate on the computer the structure, dynamics, and function of biological molecules. Computer models of water, proteins, membranes, and proteins are used to simulate on the computer the structure, dynamics, and function of biological molecules. Computer models of water, proteins, membranes, and others.

COM S 430 Information Retrieval (also INFO 430)
Fall. 3 credits. Prerequisite: COM S 211 or equivalent.
This course studies the methods used to search and recover 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.

COM S 431 Web Information Systems (also INFO 431)
Spring. 3 credits. Prerequisites: COM S 211 and some familiarity with the technology of web sites.
This course examines the architecture of web information systems, such as distributed digital libraries and electronic publishing systems. Many of the topics presented in the course 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 includes exploration of current tools for building web information systems such as XML, XSLT, and RDF with broader concepts such as technique-que for knowledge representation and retrieval, 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 environment and web environment, exemplified by libraries, and the distributed information environment of the web.

COM S 432 Introduction to Database Systems
Fall. 3 credits. Prerequisites: COM S 312, or COM S 211/212, and permission of instructor. Recommended. COM S 213 and strong programming skills in C or C++.
An introduction to modern relational database systems. Concepts covered include storage structures, access methods, query languages, query processing and optimization, transaction processing, and database design theory. The course primarily covers the internals of database systems and includes four large programming assignments in C++.

COM S 433 Practicum in Database Systems
Fall. 2 credits. Corequisite: COM S 432. COM S majors must take one of the following toward their degree: COM S/INFO 330 or COM S 433.
An introduction to building web-based database applications. Students implement a small e-commerce system using Active Server Pages, Java Server Pages, Cookies, and Servlets. The practicum also introduces technologies such
as XML/XPath/XSLT and WAP. COM S majors may use only one of the following toward their degree: COM S/INFO 330 or COM S 433.

COM S 465 Computer Graphics I (also ARCH 374)
Fall. 4 credits. Prerequisite: COM S/ENG RD 211. May not be taken after completion of COM S 417.

An introduction to the principles of computer graphics in two and three dimensions. Topics include digital images, filtering and anti-aliasing, 2D and 3D affine geometry, ray tracing, perspective and 3D viewing, the graphics pipeline, curves and surfaces, and human visual perception. Homework assignments require programming.

COM S 467 Computer Graphics II
Spring. 3 credits. Prerequisite: COM S 465.

This course covers the principles of computer graphics including advanced topics such as the modern graphics hardware pipeline, transformations, materials and shading models, advanced texturing, shadow algorithms, hierarchical acceleration structures, global illumination, animation, and 3D surface modeling.

COM S 468 Computer Graphics Practicum
Spring. 2 credits. Prerequisite: COM S 465. Corequisite: COM S 467.
This course provides COM S 467 students with hands-on experience in computer graphics programming on modern graphics hardware with a final 3D game project. Programming assignments cover 3D transformations, modeling, shading, rendering, animation, and user interfaces. The course uses Java, OpenGL, and Cg for code development.

COM S 472 Foundations of Artificial Intelligence
Fall. 3 credits. Prerequisites: COM S/ENG RD 211 and COM S 280 (or equivalent).

A 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.

COM S 473 Practicum in Artificial Intelligence
Fall. 2 credits. Corequisite: COM S 472.
Project portion of COM S 472. Topics include knowledge representation systems, search procedures, game-playing, automated reasoning, concept learning, reinforcement learning, neural nets, genetic algorithms, planning, and truth maintenance.

COM S 474 Introduction to Natural Language Processing (also GOGST 474, LING 474)
Fall. 4 credits. Prerequisites: COM S 211.

An introduction to the 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.

COM S 486 Machine Learning
Spring. 4 credits. Prerequisites: COM S 280, 512, and basic knowledge of linear algebra and probability theory.

Learning and classifying are two of our basic abilities. Machine learning is concerned with the question of how to train computers to learn from experience, to adapt and make decisions accordingly. This course introduces the set of techniques and algorithms that constitute machine learning as of today, including inductive inference of decision trees, the parametric-based Bayesian learning approach, Bayesian belief networks and Hidden Markov Models, non-parametric methods, discriminant functions and support vector machines, neural networks, stochastic methods such as genetic algorithms, unsupervised learning and clustering, and other issues in the theory of machine learning. These techniques are used today to automate procedures that were previously performed by humans as well as to explore untouched domains of science.

COM S 480 Introduction to Cryptology (also MATH 335)
Fall, spring. 3 credits. Prerequisites: COM S 100 and MATH 222 or 294.
Students who take this course may not also receive credit for MATH 336. For description, see MATH 335.

COM S 481 Introduction to Theory of Computing
Fall. 4 credits. Prerequisite: COM S 280 or permission of instructor. Credit will not be granted for both COM S 381 and 481. Corrective transfers between COM S 481 and 381 (in either direction) are encouraged during the first few weeks of instruction.

A faster-moving and deeper version of COM S 381.

COM S 482 Introduction to Analysis of Algorithms
Spring, summer. 4 credits. Prerequisites: COM S 280, 312, and either 381 or 481, or permission of instructor.

Techniques used in the creation and analysis of algorithms. Combinatorial algorithms, computational complexity, NP-completeness, and intractable problems.

COM S 483 Quantum Computation (also PHYS 481 and 681)
Spring. 2 credits. Prerequisite: familiarity with the theory of vector spaces over the complex numbers. Not offered every year.

For description, see PHYS 481.

COM S 501 Software Engineering
Spring. 4 credits. Prerequisite: COM S 211 or equivalent experience programming in Java or C++.

An introduction to the practical problems of specifying, designing, and building large, reliable software systems. Students work in teams on projects for real clients. This work includes a feasibility study, requirements analysis, object-oriented design, implementation, testing, and delivery to the client. Additional topics covered in lectures include professionalism, project management, and the legal framework for software development.

COM S 504 Applied Systems Engineering (also CEE 504, ECE 512, M&A 591, OR&IE 512, SYSEN 510)
Spring. 3 credits. Prerequisite: Applied System Engineering (CEE 504, COM S 504, ECE 512, M&A 591, OR&IE 512, SYSEN 510).

For description, see SYSEN 510.

COM S 505 Systems Architecture, Behavior, and Optimization (also CEE 505, ECE 513, M&A 592, OR&IE 513, SYSEN 520)
Spring. 3 credits. Prerequisite: Applied System Engineering (CEE 504, COM S 504, ECE 512, M&A 591, OR&IE 512, SYSEN 510).

For description, see SYSEN 520.

COM S 513 Systems Security
Fall. 4 credits. Prerequisites: COM S 414 or 419 and familiarity with JAVA or C# programming languages.

This course discusses security and survivability for computers and communications network. The course includes discussions of policy issues (e.g., the national debates on cryptography policy) as well as the discussions of the technical alternatives for implementing the properties that constitute "trustworthiness" of a computing system. Mechanisms for authorization and authentication as well as cryptographic protocols are covered.

COM S 514 Intermediate Computer Systems
Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor.

This course focuses on practical issues in designing and implementing distributed software. Topics vary depending upon 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 coregistering in COM S 490, 515, or 790.

COM S 522 Computational Tools and Methods for Finance
Spring. 4 credits. Prerequisites: programming experience (e.g., C, FORTRAN, or MATLAB), some knowledge of numerical methods, especially numerical linear algebra. Not offered every year.

This course provides a hands-on introduction to computational methods and tools used in finance. Students study both the underlying methods and efficient implementation. The MATLAB Financial Toolbox, along with additional MATLAB tools, are used

COM S 614 Advanced Systems
Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor.
An advanced course in systems, emphasizing contemporary research in distributed and parallel 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.

COM S 615 Peer-to-Peer Systems
Spring. 4 credits. Prerequisites: COM S 614 recommended. Peer-to-peer (P2P) is a new paradigm for distributed computing. P2P systems lack centralized servers and rely on self-organization and peer-to-peer resource sharing to accomplish their tasks. In this course, we examine the peer-to-peer paradigm, examine peer-to-peer systems, and discuss existing and new applications. Students are expected to perform an in-depth study of an existing approach or to develop new peer-to-peer systems and applications as part of the course project.

COM S 619 Advanced Computer Networks
Fall. 4 credits. Prerequisite: COM S 419 or COM S 519 or permission of instructor. Not offered every year.
This course 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.

COM S 621 Matrix Computations
Fall. 4 credits. Prerequisites: MATH 411 and 431 or permission of instructor. Stable and efficient algorithms for linear equations, least squares, and eigenvalue problems. Direct and iterative methods are considered. The MATLAB system is used extensively.

COM S 622 Numerical Optimization and Nonlinear Algebraic Equations
Spring. 4 credits. Prerequisite: COM S 621. Offered odd-numbered years only.
Modern algorithms for the numerical solution of multidimensional optimization problems and simultaneous nonlinear algebraic equations. Emphasis is on efficient, stable, and reliable numerical techniques with strong global convergence properties: quasi-Newton methods, modified Newton algorithms, and trust-region procedures. Special topics may include large-scale optimization, quadratic programming, and numerical approximation.

COM S 624 Numerical Solution of Differential Equations
Spring. 4 credits. Prerequisites: previous exposure to numerical analysis (e.g., COM S 421 or 621) and differential equations, and knowledge of MATLAB. Offered in even-numbered years.
COM S 664 Machine Vision  
Fall. 4 credits. Prerequisites: undergraduate level understanding of algorithms and MATH 221 or equivalent.  
An introduction to computer vision, with an emphasis on discrete optimization algorithms and on applications in medical imaging. The following topics are covered: 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.

COM S 665 Advanced Rendering  
Fall or spring. 4 credits. Prerequisites: COM S 465 and 467 or equivalent and an undergraduate-level understanding of algorithms, probability and statistics, vector calculus, and programming.  
This course covers advanced topics in realistic rendering with a focus on interactive techniques. Topics include light transport and global illumination, Monte-Carlo rendering, and image-based rendering. Students are required to implement several of the algorithms covered in the course and complete a final project.

COM S 667 Physically Based Rendering  
Fall or spring. 4 credits. Prerequisites: COM S 465 and 467 or equivalent and an undergraduate-level understanding of algorithms, programming, and vector calculus. Offered spring 2004.  
An advanced course in realistic image synthesis, focusing on the computation of physically accurate images. Topics include radiometry, light transport and global illumination, rendering with participating media; advanced models for material properties; and physical measurement of light sources, images, and materials.

COM S 671 Introduction to Automated Reasoning  
Fall or spring. 4 credits. Prerequisite: COM S 611 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.

COM S 672 Advanced Artificial Intelligence  
Spring. 4 credits. Prerequisites: COM S 472 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.

COM S 673 Integration of Artificial Intelligence and Operations Research (also CIS 673)  
Spring. 3 credits. Prerequisite: COM S 478 or equivalent.  
This course covers topics on the integration of artificial intelligence (AI) and operations research (OR) techniques for solving combinatorial problems as they appear in AI and OR applications. Application domains include AI planning, scheduling, combinatorial auctions, market mechanisms, and combinatorial designs.

COM S 674 Natural Language Processing  
Spring. 3 credits. Prerequisites: COM S 472 or permission of instructor. COM S 474 is NOT a prerequisite. Not offered every year.  
This course presents a graduate-level introduction to natural language processing, the primary concern of which is the study of human language use from a computational perspective. The course covers syntactic analysis, semantic interpretation, and discourse processing, examining both symbolic and statistical approaches. Possible topics include information extraction, natural language generation, memory models, ambiguity resolution, finite-state methods, mildly context-sensitive formalisms, deductive approaches to interpretation, machine translation, and machine learning of natural language.

COM S 676 Reasoning about Knowledge  
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic.  
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.

COM S 677 Reasoning about Uncertainty  
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic.  
Examines formalizing reasoning about and representing uncertainty, using formal logical approaches as a basis. Topics: logic of probability, combining knowledge and probability, probability and adversaries, conditional logics of normality, Bayesian networks, qualitative approaches to uncertainty, going from statistical information to degrees of belief, and decision theory.

COM S 678 Advanced Topics in Machine Learning  
Spring. 4 credits. Prerequisites: COM S 478 or equivalent, or COM S 578 or equivalent, or permission of instructor.  
This course extends and complements COM S 478 and COM S 578, 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.

COM S 681 Analysis of Algorithms  
Fall. 4 credits. Prerequisite: COM S 482 or graduate standing.  
Methodology for developing efficient algorithms, primarily for graph theoretic problems. Understanding of the inherent complexity of natural problems via polynomial-time algorithms, randomized algorithms, NP-completeness, and randomized reductions. Also covers topics such as parallel algorithms and efficient data structures.

COM S 682 Theory of Computing  
Spring. 4 credits. Prerequisites: (COM S 381 or 481) and (COM S 482 or 681) or permission of instructor.  
Advanced treatment of theory of computation, computational-complexity theory, and other topics in computing theory.

COM S 683 Advanced Design and Analysis of Algorithms  
Spring. 4 credits. Prerequisites: COM S 681 or permission of instructor. Not offered every year.

COM S 684 Algorithmic Game Theory  
Spring. 4 credits. Prerequisites: background in algorithms and game theory at the level of COM S 482. No prior knowledge of game theory or economics is assumed.  
Algorithmic game theory combines algorithmic thinking with game-theoretic or, more generally, economic concepts. The course focuses on problems arising from, and motivated by, the Internet and other decentralized computer networks. The most defining characteristic of the Internet is that it was not designed by a single central entity, but emerged from the complex interaction of many economic agents, such as network operators, service providers, designers, users, etc., 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, multiauction pricing, and more.

COM S 685 The Structure of Information Networks (also INFO 685)  
Spring. 4 credits. Prerequisite: COM S 482.  
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.

COM S 686 Logics of Programs  
Spring. 4 credits. Prerequisites: COM S 481, 682, and MATH 481 or MATH/COM S 486. Not offered every year.

COM S 709 Computer Science Colloquium  
Fall, spring. 1 credit. S-U grades only.  
For staff, visitors, and graduate students interested in computer science. A weekly meeting for the discussion and study of important topics in the field.
COM S 711 Seminar in Advanced Programming Languages  
Fall, spring. 3 credits.

COM S 713 Seminar in Systems and Methodology  
Fall, spring. 4 credits. Prerequisite: a graduate course employing formal reasoning such as COM S 611, 613, 671, a logic course, or permission of instructor. Not offered every year.

Discussion of contemporary issues in the design and analysis of computing systems. Emphasis is on the proper use of rigor, models, and formalism.

COM S 715 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.

COM S 717 Topics in Parallel Architectures  
Fall, 4 credits. Prerequisite: COM S 612 or permission of instructor. Not offered every year.

Covers topics in parallel computers. Material includes: architectures of parallel computers, parallelizing compilers, operating systems for parallel computers, and languages (functional and logic-programming languages) designed for parallel computation.

COM S 718 Computer Graphics Seminar  
Fall, spring. 4 credits.

COM S 719 Seminar in Programming Languages  
Fall, spring. 4 credits. Prerequisite: COM S 611 or permission of instructor. Not offered every year.

Covers topics in parallel computers. Material includes: architectures of parallel computers, parallelizing compilers, operating systems for parallel computers, and languages (functional and logic-programming languages) designed for parallel computation.

COM S 721 Topics in Numerical Analysis  
Fall, spring. 4 credits. Prerequisite: COM S 621 or 622 or permission of instructor. Not offered every year; semester BIB.

Topics are chosen at instructor's discretion.

COM S 726 Problems and Perspectives in Computational Molecular Biology (also PL BR 726)  
Fall, spring. 1 credit. S-U grades only.

This is a weekly seminar discussing timely topics in computational molecular biology. The course addresses methodological approaches to sequence and structure analysis, function prediction, study of evolutionary relationships, and analysis of large biological systems. Statistical and deterministic computational approaches are covered, and specific and detailed biological examples are discussed. In each topic, we select one or two representative papers that made significant advances in this field. The lectures are given by faculty and students. The seminar is open to all from the life sciences, computational sciences, and physics sciences. We try to bridge these disciplines by pairing students/faculty from complementary backgrounds.

COM S 732 Seminar in Database Systems  
Fall, spring. 4 credits. S-U grades only.

COM S 750 Evolutionary Computation and Design Automation (also CIS 750, M&AE 650)  
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.

COM S 751 Media Research and Critical Design (also CIS 751)  
Fall. 4 credits. Prerequisite: graduate standing in COM S or equivalent ability to read technical research papers. Contact instructor if unsure of qualifications. Not offered every year.

COM S 754 Systems Research Seminar  
Fall, spring. 1 credit. S-U grades only.

COM S 772 Seminar in Artificial Intelligence  
Fall, spring. 4 credits. Prerequisites: permission of instructor. S-U grades only.

COM S 775 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.

COM S 786 Introduction to Kleene Algebra  
Spring. 4 credits. Prerequisites: COM S 481 required; COM S 682, elementary logic (MATH 481 or 681), algebra (MATH 432) recommended.

Kleene algebra is an algebraic system that axiomatically captures the properties of a natural class of structures arising in logic and computer science. It has appeared in various guises in relational algebra, semantics and logics of programs, automata and formal language theory, and the design and analysis of algorithms. In this course, we review the history of the development of Kleene algebra and Kleene algebra with tests (Kleene/Boolean algebra). We study models, compare axiomatizations, and derive completeness, expressiveness, and complexity results. We also discuss various applications in program schema-��ization, program verification, compiler optimization, and programming language semantics and logic.

COM S 789 Seminar in Theory of Algorithms and Computing  
Fall, spring. 4 credits. Prerequisite: permission of instructor. S-U grades only.

COM S 790 Special Investigations in Computer Science  
Fall. 4 credits. Prerequisite: permission of a computer science adviser. Letter grade only. Independent research or Master of Engineering project.

COM S 990 Special Investigations in Computer Science  
Fall, spring. Prerequisite: permission of a computer science adviser. S-U grades only. Doctoral research.

INFORMATION SCIENCE (INFO)  

INFO 130 Introductory Design and Programming for the Web (also COM S 130)  
Fall. 3 credits. For description, see COM S 130.

INFO 214 Cognitive Psychology (also COGST 214, PSYCH 214)  
Fall. 3 credits. Prerequisite: COM S/INFO 130 or equivalent knowledge.

INFO 230 Intermediate Design and Programming for the Web (also COM S 230)  
Spring. 3 credits. Prerequisite: COM S/INFO 130 or equivalent knowledge.

INFO 245 Psychology and Social Computing (also COMM 245)  
Fall. 3 credits. Prerequisite: COM S/INFO 130 or equivalent knowledge.

INFO 292 Inventing an Information Society (also ECE 298, ENGRG 298, HIST 292, S&T 292)  
Spring. 3 credits. Prerequisite: COM S/INFO 130 or equivalent knowledge.

INFO 295 Information Modeling  
Fall. 4 credits. Corequisite: MATH 231 or equivalent.

This course teaches basic mathematical concepts in information modeling. Topics covered include graph theory, discrete probability, finite automata, Markov models, and hidden Markov models. We use examples and applications from various areas of information science such as the structure of the web, genome sequences, natural languages, and signal processing.

INFO 330 Applied Database Systems (also COM S 330)  
Fall. 3 credits. Prerequisites: COM S 211/ENGRG 211.

For description, see COM S 330.

INFO 345 Human-Computer Interaction Design (also COMM 345)  
Spring. 3 credits.

For description, see COMM 345.

INFO 349 Media Technologies (also S&T 349)  
Spring. 3 credits. Not offered spring 2005.

For description, see S&T 349.

INFO 355 Computers: From Babbage to Gates (also S&T 355)  
Spring. 4 credits.

For description, see S&T 355.

INFO 387 The Automatic Lifestyle: Consumer Culture and Technology (also S&T 387)  
Spring. 4 credits. Not offered spring 2005.

For description, see S&T 387.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites and Notes</th>
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<tr>
<td>INFO 430</td>
<td>Information Discovery (also COM S 430)</td>
<td>3</td>
<td>Fall. Prerequisite: COM S 211/ENGRD 211 or equivalent. For description, see COM S 430.</td>
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<tr>
<td>INFO 431</td>
<td>Web Information Systems (also COM S 431)</td>
<td>3</td>
<td>Spring. Prerequisites: COM S 211 and some familiarity with the technology of web sites.</td>
</tr>
<tr>
<td>INFO 435</td>
<td>Seminar on Applications of Information Science (also INFO 635)</td>
<td>3</td>
<td>Spring. Prerequisites: background in computing, data structures, and programming at the level of COM S 211 or equivalent, and experience in using information systems. Undergraduates and masters students should register for INFO 435. Ph.D. students should register for INFO 635. This seminar course examines the technological, sociological, legal, financial, and political aspects of information systems in the context of innovative applications. The course is designed as a series of case studies in information science, with presentations given by the people involved in designing or maintaining those systems. Examples include arXiv, NSDL, NuPrl, the Legal Information Institute, Protomap, Dspace, and others created or maintained at Cornell, as well as some representative exterior resources. The case studies are augmented by readings and discussions of recent articles on technical components of the information systems, including machine learning tools, link and network analysis, metadata standards, document formats and clustering, data integrity, and natural language processing. Aspects of human and social interactions with the information systems considered include copyright issues, privacy issues, public/private partnerships, and publishing models.</td>
</tr>
<tr>
<td>INFO 440</td>
<td>Advanced Human-Computer Interaction Design (also COMM 440)</td>
<td>3</td>
<td>Fall. For description, see COMM 440.</td>
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<tr>
<td>INFO 447</td>
<td>Social and Economic Data (also ILR 447)</td>
<td>4</td>
<td>Spring. Prerequisites: one semester of calculus, the IS statistics requirement, at least one upper-level social science course, or permission of the instructor. For description, see ILR 447.</td>
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<tr>
<td>INFO 450</td>
<td>Language and Technology (also COMM 450)</td>
<td>3</td>
<td>Spring. For description, see COMM 450.</td>
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<tr>
<td>INFO 490</td>
<td>Independent Reading and Research</td>
<td>1-4</td>
<td>Fall, spring. For description, see COMM 490.</td>
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<tr>
<td>INFO 491</td>
<td>Teaching in Information Science, Systems, and Technology</td>
<td>Variable</td>
<td>Fall, spring. For description, see COMM 491. This course involves working as a T.A. in a course in the information science, systems, and technology major.</td>
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<tr>
<td>INFO 515</td>
<td>Culture, Law, and Politics of the Internet</td>
<td>4</td>
<td>Fall. This course explores the culture, law, and politics of the Internet. Free speech concerns, Internet governance, domain naming, copyright, privacy, and security are highlighted as well as a variety of policy issues such as acceptable-use bandwidth usage on campuses, protocols for DMCA compliance, and the balance of classroom and distributed learning.</td>
</tr>
<tr>
<td>INFO 530</td>
<td>The Architecture of Large-Scale Information Systems (also COM S 530)</td>
<td>4</td>
<td>Spring. Prerequisite: COM S/INFO 330 or COM S 432. For description, see COM S 530.</td>
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<tr>
<td>INFO 614</td>
<td>Cognitive Psychology (also PSYCH 614)</td>
<td>5</td>
<td>Fall. S. Edelman. For description, see PSYCH 614.</td>
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<tr>
<td>INFO 630</td>
<td>Representing and Accessing Digital Information (also COM S 630)</td>
<td>4</td>
<td>Fall. Prerequisite: COM S 472 or 478 or 578 or the equivalent. For description, see COM S 630.</td>
</tr>
<tr>
<td>INFO 634</td>
<td>Information Technology in Sociocultural Context (also S&amp;TS 634)</td>
<td>4</td>
<td>Fall. Prerequisite: permission of instructor. For description, see S&amp;TS 634.</td>
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<tr>
<td>INFO 635</td>
<td>Seminar on Applications of Information Science (also INFO 435)</td>
<td>3</td>
<td>Spring. Prerequisites: background in computing, data structures, and programming at the level of COM S 211 or equivalent, and experience in using information systems. For description, see INFO 435.</td>
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<tr>
<td>INFO 640</td>
<td>Human-Computer Interaction Design (also COMM 640)</td>
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<td>Fall. Prerequisite: graduate standing or permission of instructor. For description, see COMM 640.</td>
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<tr>
<td>INFO 685</td>
<td>The Structure of Information Networks (also COM S 685)</td>
<td>4</td>
<td>Spring. Prerequisite: COM S 482. For description, see COM S 685.</td>
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</tbody>
</table>
The School of Continuing Education and Summer Sessions (SCE) is dedicated to providing outstanding educational opportunities throughout the year for people of all ages and interests.

Our programs are presented in a wide variety of formats and time frames and are offered on and off campus and via distance learning.

Join us to prepare for your future. Enhance your studies, improve your job skills, or simply have fun learning something new!

For information about the following programs, write B20 Day Hall, Ithaca, NY 14853–2801; call 255–4987; e-mail cusce@cornell.edu; or fax 255–9697; unless indicated otherwise below. You may also visit us on the web at www.sce.cornell.edu.

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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 255–4987; e-mail cusce@cornell.edu; or fax 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 14853–4601; call 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 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.

Distance Learning Course Roster
AM ST 202 Popular Culture in the United States, 1945 to the Present
AN SC 222 Canine Genetics
ASIAN 225 Literature, Politics, and Genocide in Cambodia
BEE 299 Sustainable Development
COMM 120 Contemporary Mass Communication
COMM 272 Principles of Public Relations and Advertising
COMM 376 Planning Communication Campaigns
ECON 101 Introductory Microeconomics
GOVT 161 Introduction to Political Philosophy
GOVT 314 Prisons: The Politics of Incarceration in America
ILRST 210 Statistical Reasoning
ILRST 510 Statistical Methods for the Social Sciences I

CyberTower: Cornell at No Cost
Cornell’s online CyberTower program is a great way to meet Cornell faculty and explore fascinating topics ranging from mastodons and wine appreciation to today’s headline news, all at no cost.

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 and follow the registration instructions. 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, both on and off campus, in study tours and in locations worldwide via distance learning. 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 255–2259; e-mail cuexec@cornell.edu; fax 255–4982; 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 Visitor's Program and receive a 90 percent discount on tuition.

For information, write to Extramural Study, B20 Day Hall, Ithaca, NY 14853-2801; call 255-4987; or visit www.cuse.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 255-7259; e-mail cusce@cornell.edu; fax 255-9697; or visit www.cuse.cornell.edu/sp.

On-Campus Special Programs Roster
AEM Certificate in Business Management
African Languages: Swahili
Intensive Arabic Program
Architecture
Art in the Modern World: Expressive Culture and Performance
Asian Studies Programs: Chinese, Japanese, Nepali, Sinhala, Tibetan
Biological Sciences Undergraduate Research Program
City and Regional Planning: Using GIS for Neighborhood Analysis
Cornell Institute for Biology Teachers Education
Engineering Cooperative Education Program
Summer Intensive English Program
Freshman Summer Start
School of Hotel Administration Executive Education Programs
Industrial and Labor Relations: Strategic Corporate Research
International Business Program
Japanese Teacher Training Workshop
Landscape Architecture: Site Grading
Latin American Studies Summer Program
CNS Institute for Physics Teachers
Prefreshman Summer Program

Telluride Association Summer Program
Leadership Program for Veterinary Students

Off-Campus Special Programs Roster
Indigenous Amazonian Culture
Architecture Art Studio and Creative Writing Workshop in Rome, Italy
Electronic Imaging in South Eastern Europe
Geologic Field Mapping in Argentina
Human Ecology: Urban Semester Program—The Culture of Medicine
Investment Management Program
Latin American Studies Summer Programs in Bolivia and Brazil
Marine Science: Shoals Marine Laboratory, Maine
Satellite Remote Sensing Applications in Biological Oceanography
Summer in Washington

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• Develop professional contacts
• Take focused, intensive classes
• Learn from distinguished professors, alumni, practitioners, and executives
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For more information, visit www.sce.cornell.edu/sp.

Campus-to-Careers Programs Roster
AEM Certificate in Business Management
Cornell University Prelaw Program
International Business Program
Investment Management Program
Summer in Washington
Practicing Medicine/Providing Health Care

SUMMER COLLEGE PROGRAMS FOR HIGH SCHOOL STUDENTS
Cornell's award-winning programs for high school students offer one-, three-, 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 255-6203; e-mail summer_college@cornell.edu; fax 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 255-4987; e-mailcusce@cornell.edu; fax 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
ASIAN 250 Introduction to Asian Religions
AS&RC 131 Swahili (off campus)
BIOEE 264 Tropical Field Ornithology (off campus)
CRP 495.18 Introduction to Peace Science
COMM 263 Organizational Writing
EAS 305 Field Study in Hawaii (off campus)
ECON 101 Introductory Microeconomics DL
ECON 102 Introductory Macroeconomics
ECON 307 Introduction to Peace Science
ENGL 257 American Musical Theatre in New York City (off campus)
ENGL 280 Creative Writing
ENGL 288 Expository Writing
MUSIC 257 American Musical Theatre in New York City (off campus)
OR&IE 350 Financial and Managerial Accounting
RELS 250 Introduction to Asian Religions
THETR 257 American Musical Theatre in New York City (off campus)
Practicing Medicine/Providing Health Care (off campus)

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 an outstanding faculty, three-quarters of whom teach year round. 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, picnic, or enjoy a sunset concert on the Arts Quad.

However you look at it, spending a summer at Cornell is a great way to enjoy the best of the university and the best of summer!

For information call 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 to the web (www.summer.cornell.edu) in the fall as the roster is developed. A preliminary course roster is available beginning in November. If a course is also offered through distance learning, the course title will be followed by **DL**.

**Africana Studies**

AS&RC 131–132 Swahili

AS&RC 205 African Cultures and Civilizations

**American Studies**

AM ST 104 Introduction to American History

AM ST 124 Democracy and Its Discontents: Political Traditions in the United States

AM ST 341 Recent American History, 1960 to the Present

**Anthropology**

ANTHR 100 Introduction to Archaeology

ANTHR 101–102 Introduction to Anthropology

ANTHR 389 Culture and Emotion: Love and Death in Cross-Cultural Perspective

**Applied Economics and Management**

AEM 209 Introduction to Business Statistics

AEM 210 Introductory Statistics

AEM 221 Financial Accounting

AEM 250 Environmental and Resource Economics

AEM 320 Business Law I

AEM 323 Managerial Accounting

AEM 416 Consumer Demographics and Market Analysis

AEM 499 Undergraduate Special Topics in Applied Economics and Management

**Archaeology**

ARKEO 100 Introduction to Archaeology

Other field study opportunities are usually available through this department.

**Architecture**

ARCH 110 Introduction to Architecture: Design Studio

ARCH 130 Introduction to Architecture: Lecture Series

ARCH 251 Photography I

ARCH 351 Photography II

Consult the Department of Architecture office for a complete list of summer design offerings including foreign study opportunities.

**Art**

ART 121 Introductory Painting

ART 131 Introductory Intaglio

ART 141 Introductory Sculpture

ART 151–152 Drawing I and II

ART 159 Life and Still-Life Drawing

ART 161 Photography I

ART 168 Black-and-White Photography

ART 169 Color Photography

ART 171–172 Electronic Imaging in Art

ART 221 Painting II

ART 231 Intaglio II

ART 241 Sculpture II

ART 261 Photography II

ART 263 Color Photography

ART 361 Photography III

**Astronomy**

ASTRO 105 An Introduction to the Universe

ASTRO 106 Essential Ideas in Relativity and Cosmology

ASTRO 107 An Introduction to the Universe

**Biological Sciences**

**Ecology and Evolutionary Biology**

BIOEE 207 Evolution

BIOEE 261 Ecology and the Environment

BIOEE 457 Seminar in the History of Biology: Evolution, Ethics, and Meaning in Life

**Microbiology**

BIOM 290–291 General Microbiology

**Molecular Biology and Genetics**

BIO G 200 Special Studies in Biology

BIOG 261 Genetics

BIOM 333 Principles of Biochemistry: Proteins, Metabolism, and Molecular Biology

BIOM 432 Survey of Cell Biology

BIOM 440 Laboratory in Biochemistry and Molecular Biology

BIOM 441 Experimental Proteins and Enzymology

**Neurobiology and Behavior**

BIO G 107–108 General Biology

BIONB 221 Neurobiology and Behavior I: Introduction to Behavior

**Plant Biology**

BIO G 209 Introduction to Natural-Science Illustration

BIOP 240 Green World/Blue Planet

BIOP 245 Plant Biology

**Biology and Society**

B&SOC 205 Ethical Issues in Health and Medicine

B&SOC 447 Seminar in the History of Biology: Evolution, Ethics, and Meaning in Life

**Biological Statistics and Computational Biology**

BTRY 301/601 Statistical Methods I

**Chemistry and Chemical Biology**

CHEM 206 Introduction to General Chemistry

CHEM 207–208 General Chemistry

CHEM 251 Introduction to Experimental Organic Chemistry

CHEM 257 Introduction to Organic and Biological Chemistry

**Classics**

CLASS 236 Greek Mythology

CLASS 268 A History of Rome from Republic to Principate

**Greek**

CLASS 103 Intensive Greek

**Latin**

CLASS 107 Intensive Latin

**Cognitive Studies**

COGST 101 Introduction to Cognitive Science

**Communication**

COMM 116 Communication in Social Relationships

COMM 120 Contemporary Mass Communication DL

COMM 201 Oral Communication

COMM 203 Argumentation and Debate

COMM 260 Science Writing for Public Information

COMM 263 Organizational Writing

COMM 272 Principles of Public Relations and Advertising DL

COMM 350 Writing for Magazines

COMM 410 Organizational Communication: Theory and Practice
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<td>COM L 236 Greek Mythology</td>
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<td>Computer Science</td>
<td>COM S 099 Fundamental Programming Concepts</td>
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<td>COM S 100 Introduction to Computer Programming</td>
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<td>COM S 101 Introduction to Cognitive Science</td>
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<td>COM S 130 Creating Web Documents</td>
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<td>COM S 172 Computation, Information, and Intelligence</td>
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<td>COM S 211 Computers and Programming</td>
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<td>COM S 212 Java Practicum</td>
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<td>Developmental Sociology</td>
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<td>Earth and Atmospheric</td>
<td>EAS 108 Earth in the News</td>
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<td>EAS 154 The Sea: An Introduction to Oceanography, Lectures</td>
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<td>Sciences</td>
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<td>ECON 102 Introductory Macroeconomics</td>
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<td>ECON 313 Intermediate Microeconomic Theory (calculus)</td>
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<td>ECON 314 Intermediate Macroeconomic Theory</td>
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<td>ECON 362 International Monetary Theory and Policy</td>
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<td>ECON 434 Financial Economics, Derivatives, and Risk Management</td>
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<td>Engineering</td>
<td>ENGR 115 Engineering Applications of Operations Research</td>
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<td>ENGRD 211 Computers and Programming</td>
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<td>ENGRD 221 Thermodynamics</td>
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<td>ENGRD 270 Basic Engineering Probability and Statistics</td>
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<td>ENGRD 322 Introduction to Scientific Computation</td>
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<td>Hotel Administration</td>
<td>H ADM 165 Managerial Communication I</td>
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<td>Human Development</td>
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<td>HD 216 Human Development: Adolescence and Youth</td>
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<td>HD 365 The Social Development of Masculinity</td>
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<td>HD 370 Adult Psychopathology</td>
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<td>English</td>
<td>ENGL 131 FWS: Reading and Writing About . . . ?</td>
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<td>ENGL 132 FWS: The Familiar Essay</td>
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<td>English as a Second Language</td>
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<td>English for Academic Purposes</td>
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<td>Government</td>
<td>GOVT 111 Introduction to American Government and Politics</td>
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<td>GOVT 131 Introduction to Comparative Government and Politics</td>
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<td>GOVT 181 Introduction to International Relations</td>
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<td>GOVT 386 The Causes of War</td>
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<tr>
<td>History</td>
<td>HIST 124 Democracy and its Discontents: Political Traditions in the United States</td>
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<td>HIST 154 Introduction to American History</td>
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<td>HIST 268 A History of Rome from Republic to Principate</td>
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<td>HIST 279 European Cultural History: From the Enlightenment to the Fin de Siecle</td>
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<td>HIST 287 Evolution</td>
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<td>HIST 340-341 Recent American History</td>
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<td>HIST 415 Seminar in the History of Biology: Evolution, Ethics, and Meaning in Life</td>
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<tr>
<td>History of Art</td>
<td>ART H 202 Survey of European Art: Renaissance to Modern</td>
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<td>ART H 261 Introduction to Art History: Modern Art</td>
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<tr>
<td>Industrial and Labor</td>
<td>ILRCB 100 Introduction to United States Labor History; Nineteenth Century</td>
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<tr>
<td>Relations</td>
<td>ILRHR 260/560 Human Resource Management</td>
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<td>ILRHR 268 Personal Computer Basics</td>
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<td>ILRHR 457 Managing for Personal and Organizational Survival</td>
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<tr>
<td>International and</td>
<td>ILRIC 333/533 Politics of the Global North</td>
</tr>
<tr>
<td>Comparative Labor</td>
<td>ILROB 170 Introduction to Microorganizational Behavior and Analysis</td>
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<td>ILROB 520 Organizational Behavior and Analysis</td>
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<tr>
<td>Social Statistics</td>
<td>ILRST 210-211 Statistical Reasoning I and II</td>
</tr>
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<td>ILRST 510-511 Statistical Methods for the Social Sciences I and II</td>
</tr>
<tr>
<td>Linguistics</td>
<td>LING 111-112 American Sign Language I and II</td>
</tr>
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<td>LING 170 Introduction to Cognitive Science</td>
</tr>
<tr>
<td>Management</td>
<td>NCC 556 Managerial Finance</td>
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<tr>
<td>Common Core Courses</td>
<td>NBA 548 Political Risk</td>
</tr>
<tr>
<td>Management Elective</td>
<td>NBA 666 Negotiations</td>
</tr>
<tr>
<td>Courses</td>
<td>Marine Science</td>
</tr>
</tbody>
</table>
<|                         | Consult related department listings for summer offerings in marine science. |
| Mathematics                | MATH 103 Mathematical Explorations                                    |
|                            | MATH 109 Precalculus Mathematics                                      |
|                            | MATH 111-112 Calculus                                                 |
|                            | MATH 171 Statistical Theory and Application in the Real World          |
|                            | MATH 191-192 Calculus for Engineers                                  |
|                            | MATH 293-294 Engineering Mathematics                                 |
|                            | MATH 311 Introduction to Analysis                                     |
|                            | MATH 332 Algebra and Number Theory                                   |
| Mechanical and Aerospace   | M&AE 221 Thermodynamics                                               |
| Engineering                | Music                                                                  |
|                            | MUSIC 105 Introduction to Music Theory                                |
|                            | MUSIC 331 Sage Chapel Choir                                           |
Near Eastern Studies
NES 280  Bosnian Literature from 1900 to the Present

Nutritional Sciences
NS 422  Exercise Physiology and Human Performance

Operations Research and Industrial Engineering
OR&IE 115  Engineering Applications of Operations Research

Philosophy
PHIL 101  Introduction to Philosophy
PHIL 145  Contemporary Moral Issues
PHIL 191  Introduction to Cognitive Science
PHIL 231  Introduction to Deductive Logic
PHIL 263  Religion and Reason

Physical Education
Consult the Physical Education office for a complete list of summer offerings for credit and recreation.

Physics
PHYS 101--102--103  General Physics
PHYS 112  Physics I: Mechanics
PHYS 213  Physics II: Heat/Electromagnetism
PHYS 214  Physics III: Optics, Waves, and Particles

Psychology
PSYCH 101  Introduction to Psychology: The Frontiers of Psychological Inquiry
PSYCH 102  Introduction to Cognitive Science
PSYCH 128  Introduction to Psychology: Personality and Social Behavior
PSYCH 199  Sports Psychology
PSYCH 280  Introduction to Social Psychology
PSYCH 325  Adult Psychopathology
PSYCH 350  Statistics and Research Design

Religious Studies
RELST 262  Religion and Reason

Romance Studies
French Language
FRROM 209  Intermediate Composition and Conversation I

Italian Language
ITALA 123  Continuing Italian

Spanish Language
SPANR 121  Elementary Spanish
SPANR 123  Continuing Spanish

Russian
RUSSA 121--122  Elementary Russian Through Film

Science and Technology Studies
S&T 205  Ethical Issues in Health and Medicine
S&T 287  Evolution
S&T 447  Seminar in the History of Biology: Evolution, Ethics, and Meaning in Life

Sociology
SOC 101  Introduction to Sociology

Textiles and Apparel
TXA 114  Introduction to Computer-Aided Design

Theatre, Film and Dance

Film Studies
FILM 324  Film Animation Workshop: Experimental and Traditional Animation on the Oxberry
FILM 383  Screenwriting

Dance
DANCE 210  Beginning Dance Composition
DANCE 303  Dance Technique Workshop

Theoretical and Applied Mechanics
T&AM 293--294  Engineering Mathematics

Writing
WRIT 134  Introduction to Writing in the University

INDIVIDUALIZED STUDY
Can’t find the course you want? Take the course independently! You’d like to study cosmic rays and high-energy electromagnetic radiation, protein structure and the nature of enzymatic catalysis, or American and European decorative arts of the Renaissance and the nineteenth century. Although there are no regularly scheduled summer courses in those areas or in other areas in which you may be interested, you may still be able to study your favorite subject. Courses that aren’t a part of the regular schedule may be offered for an individual or a group.

If you’re interested in such a course and can find a professor willing to supervise your study, pick up the application for individualized study (available on the web at www.summer.cornell.edu or from the Summer Session office). Also, please let the Summer Session office know if there are courses you would like to see offered next summer (call 255-4987 or e-mail cusce@cornell.edu).
ADMINISTRATION
W. Kent Fuchs, dean
David Gries, associate dean for undergraduate programs
Michael Spencer, associate dean for research, graduate studies, and professional education
Zellman Warhaft, associate dean for diversity
Deborah Cox, assistant dean for strategic planning, assessment, and new initiatives
Betsy East, assistant dean for student services
Cathy Long, assistant dean for administration
Marsha Pickens, 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 the Engineering Quadrangle. The Department of Biological and Environmental Engineering is in Riley-Robb Hall. Special university and college facilities augment the laboratories operated by the various engineering schools and departments, and special centers and programs contribute to opportunities for study and research.

Cornell programs and centers of interest in engineering include the following:

Center for Applied Mathematics: This cross-disciplinary center administers a graduate program.

Center for Nanoscale Systems in Information Technologies: The mission of this National Science Foundation Nanoscience and Technology Center is to explore new methods for creating nanoscale devices for use in information technologies. The facilities for this center are distributed between Clark Hall and the Engineering Quadrangle. The Nanoscale Systems in Information Technologies Center is an interdisciplinary facility, with substantial equipment and services for research in the science, engineering, and technology of nanometer-scale structures for electronic, chemical, physical, and biological applications.

Cornell Waste Management Institute: This research, teaching, and extension program is housed in the Environmental Engineering Building at Cornell.

Environmental Engineering is in the Graduate School and especially in the Sibley School of Mechanical and Aerospace Engineering.

Institute for the Study of the Continents: This interdisciplinary organization promotes research on the structure, composition, and evolution of the continents.

W. M. Keck Foundation in Nanobiotechnology: Facilities of this program include tools for nanoscale diagnostics of biomaterials.

Laboratory of Plasma Studies: A center for research in plasma physics.

Cornell Center for Materials Research: An interdisciplinary facility, with substantial support from the National Science Foundation, providing sophisticated scientific measurement and characterization equipment for materials research.

National Astronomy and Ionosphere Center: The world's largest radio-radar telescope facility, operated by Cornell in Arecibo, Puerto Rico.

Multidisciplinary Center for Earthquake Engineering Research: A center established by the National Science Foundation and a group of universities to study 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 Kimball Hall, and the Biotechnology Center.

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National Institutes of Health/National Science Foundation Developmental Resource in Structural Biology: This center provides state-of-the-art research resources and education for graduate students in structural biology.

National Institutes of Health/National Science Foundation Developmental Resource in Biophysical Imaging and Optoelectronics: This resource develops novel measurement and optical instrumentation for solving biophysical problems.

Network for Earthquake Engineering Simulation (NEES): A system of nationwide experimental facilities linked by high-performance Internet for laboratory and computational simulation of structures under earthquake loads.

Power Systems Engineering Research Center: A National Science Foundation cooperative center between university and industry in which research is centered on power systems and infrastructure networks.

Program of Computer Graphics: This interdisciplinary research center operates one of the most advanced computer-graphics laboratories in the United States.

Program on Science, Technology, and Society. This cross-disciplinary unit sponsors courses and promotes research on the interaction of science, technology, and society.

The programs listed on this page are sponsored by College of Engineering units, and several are industry affiliated.

DEGREE PROGRAMS
Cornell programs in engineering and applied science lead to the degrees of bachelor of science (B.S.), master of engineering (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 in the section "Undergraduate Study." The student pursues the degree in one of 13 majors. The majors are described in the section "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 given in most of the major areas. In addition, the following M.Eng. degrees are given: Aerospace Engineering, Biomedical Engineering, Electrical Engineering, Engineering Mechanics, Nuclear Engineering, Operations Research, and Systems Engineering. For full details on M.Eng. degrees, see the section "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) (pending)
Course Category | Credits
---|---
1. Mathematics | 16
2. Physics (major-specific) | 8-12
3. Chemistry (major-specific) | 4-8
4. First-year writing seminar | 6
5. Technical writing | 3
6. Computer programming | 4
7. Introduction to engineering (ENGRI) | 3
8. Two engineering distributions (ENGRD) | 6
9. Liberal studies distribution (6 courses min.) | 18
10. Adviser-approved electives | 6
11. Major program | 6
   a. Major-required courses | ≥ 30
   b. Major-approved electives | 9
   c. Courses outside the major | 9
12. Two terms of physical education in the freshman year and demonstration of proficiency in swimming (university requirement) | 18

Environmental Engineering, the science-of-earth-systems option in Geological Sciences, or a health-related career such as medicine should take the CHEM 207-208 sequence.

**First-Year Writing Seminars**
Each semester of their freshman year, students choose a first-year writing seminar from among more than one hundred courses offered by over thirty different departments in the humanities, social sciences, and expressive arts. These courses offer the student practice in writing English prose. They also assure 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/index.htm for more information about these alternatives.

1. ENGRD 350 or ENGRD 353, taught by the Engineering Communications Program
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 might satisfy the college's technical-writing requirement. More information is available at www.engineering.cornell.edu/ECP/Writing-IntensiveCoop.htm.
3. An officially designated Writing-intensive (W-I) engineering course:
   - ENGRD AEP 264
   - CHEM 452
   - MSE 403 & 404 (both)
   - MSE 405 & 406 (both)
   - M&AE 427
   - BEE 450 with co-registration in BEE 493
   - BEE 473 with co-registration in BEE 493
   - BEE 489
4. ENGRD 302, 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 done in his or her course for a given semester so that it will fulfill the technical-writing requirement. With the approval of the CCGS's Subcommittee on Technical Writing, the instructor may have students co-register in ENGRD 302. May be taken more than once, with different courses. By permission of engineering instructor.
5. COMM 260, 265, or 352, 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 Engineering College. It may be appropriate to petition the CCGS’s Subcommittee on Technical Writing for permission to use this experience or work (not past writing) to meet the technical-writing requirement.
Computer Programming
COM S 100, Introduction to Computer Programming, is normally taken in the freshman year to fulfill the computer programming requirement.

Before taking COM S 100, some students may take COM S 099, Fundamental Programming Concepts, offered in the fall and summer. This 2-credit S-U course is meant for students with virtually no programming experience; students with previous programming experience may not take it. Basic programming concepts and problem analysis are studied. COM S 099 may not be used as credit toward graduation.

Introduction to Engineering Course
An introduction to engineering course (designated ENGRD) must be taken during the freshman year. This course will introduce students to the engineering process and provide 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 211, Computers and Programming
   ENGRD 241, Engineering Computation
   ENGRD 521, Numerical Methods in Computational Molecular Biology
   ENGRD 322, Introduction to Scientific Computation

2. Materials science
   ENGRD 261, Introduction to Mechanical Properties of Materials: From Nanodevices to Superstructures
   ENGRD 262, Electronic Materials for the Information Age

3. Mechanics
   ENGRD 202, Mechanics of Solids
   ENGRD 203, Dynamics
   Majors in Engineering Physics may substitute A&EP 335 for ENGRD 203.

4. Probability and statistics
   ENGRD 270, Basic Engineering Probability and Statistics
   Majors in Electrical and Computer Engineering may substitute ECE 310 for ENGRD 270. Majors in Engineering Physics may substitute ECE 310 or MATH 471 for ENGRD 270. Majors in Civil Engineering and Biological Engineering may substitute CEE 304 for ENGRD 270.

5. Electrical sciences
   ENGRD 210, Introduction to Circuits for Electrical and Computer Engineers
   ENGRD 230, Introduction to Digital Logic Design
   ENGRD 264, Computer-Instrumentation Design

6. Thermodynamics and energy balances
   ENGRD 219, Mass and Energy Balances
   ENGRD 221, Thermodynamics

7. Earth and life sciences
   ENGRD 201, Introduction to the Physics and Chemistry of the Earth
   ENGRD 251, Engineering for a Sustainable Society
   ENGRD 260, Principles of Biological Engineering

8. Biology and chemistry
   ENGRD 252/A&EP 252, The Physics of Life
   BIO G 101 and 103, Biological Sciences, Lecture and Laboratory
   BIO G 105, Introductory Biology
   BIO G 107, General Biology (summer only)
   CHEM 389, Physical Chemistry I

Some majors require a specific engineering distribution course as a prerequisite for the upperclass course sequence. These requirements are as follows:

- Biological Engineering: ENGRD 202
- Chemical Engineering: ENGRD 219
- Civil Engineering: ENGRD 202
- Computer Science: ENGRD 211 (co-enrollment in COM S 212 strongly recommended)
- Electrical and Computer Engineering (pending): ENGRD 230
- Environmental Engineering: ENGRD 202
- Geosciences: ENGRD 201
- Information Science, Systems, and Technology: ENGRD 270
- Materials Science and Engineering: ENGRD 261
- Mechanical Engineering: ENGRD 202
- Operations Research and Engineering: ENGRD 270

Some majors require additional distribution courses after the student affiliates.

Liberal Studies Distribution
The following liberal studies distribution requirements begin with the class entering in 2003. Students who entered before that may choose to use the new requirements.

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 true 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 courses must be from the first three groups (CA, HA, LA).
- At least two of the six courses must be at the 200 level or higher.

The Engineering Advising web site (www.engineering.cornell.edu/studentServices/advising.cfm) contains a complete listing of acceptable courses in each group. A list of courses is 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, 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**
- Adviser-approved electives: 6 credits required (approved by the academic adviser). Because these courses should help develop and broaden the skills of the engineer, advisers 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 (Note: No ROTC courses may be used as approved electives unless they are co-listed by an academic department.)
- Major-approved electives: 9 credits (approved by the major and faculty advisers 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” section). These courses may provide students with important perspectives on their studies and their future careers.

**Engineering Advising**

Entering freshmen are assigned a faculty adviser (who may or may not be in their intended major), who remains their adviser until affiliation with a major (normally during the fourth semester). The students are also under the administration of Engineering Advising, 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 counseling. Also located in Olin Hall are the LIFE Program, Minority Programs, and Women’s Programs, which are primary resources for counseling, support, tutoring, and networking opportunities.

**Freshman-Year Requirements**

During the freshman year, engineering students are expected to complete (or receive credit for) the following core requirements:
- MATH 191 (or 190) and MATH 192
- Two of: CHEM 211, 207, 208, PHYS 112, 213, 214*
- COM S 100
- 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, Environmental Engineering, or the science-of-earth-systems option in Geology Sciences should enroll in the CHEM 207–208 sequence during their freshman year.

**Affiliation with a Major**

Students must apply for affiliation with a major during the first term 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**

<table>
<thead>
<tr>
<th>Courses and Minimum Grade Requirements</th>
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<tbody>
<tr>
<td>Biological Engineering</td>
</tr>
<tr>
<td>At most one grade below</td>
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<tr>
<td>C- in math and science courses and</td>
</tr>
<tr>
<td>BEE 151 or an equivalent</td>
</tr>
<tr>
<td>Chemical Engineering</td>
</tr>
<tr>
<td>At most one grade below</td>
</tr>
<tr>
<td>C- in chemistry, math, physics, and</td>
</tr>
<tr>
<td>chemical engineering courses. GPA</td>
</tr>
<tr>
<td>≥ 2.2 in math, science, and engineering courses</td>
</tr>
<tr>
<td>Civil Engineering</td>
</tr>
<tr>
<td>GPA ≥ 2.0 in engineering and science courses. At least C- in ENGRD 202 (or CHEM 208, for students who do not take ENGRD 202 before affiliation)</td>
</tr>
<tr>
<td>Computer Science</td>
</tr>
<tr>
<td>At least C in completed</td>
</tr>
<tr>
<td>COM S and math courses. GPA ≥ 2.7 in</td>
</tr>
<tr>
<td>COM S 211, 212, 280, GPA ≥ 2.7 in</td>
</tr>
<tr>
<td>MATH 192/293. Visit the CS undergraduate office or the CS undergraduate web site to learn about alternative criteria for affiliation.</td>
</tr>
</tbody>
</table>

Students must be affiliated or conditionally affiliated with a major by the end of their fourth semester or they will be withdrawn from the College of Engineering, unless allowed to participate in a terminal semester.

**Electrical and Computer Engineering**

At least C- in MATH 293, PHYS 213, and either ECE/ENGRD 210, ECE 220, or ENGRD 230. These courses must be taken for 4 credits. GPA ≥ 2.5 in (if completed): MATH 192, 293, 294, PHYS 213, ENGRD 211, 290, ECE/ENGRD 210, ECE 220.

**Environmental Engineering**

GPA ≥ 2.0 in engineering and science courses. At least C- in ENGRD 202 or CHEM 257.

**Geological Science**

Good academic standing in the college.

**Independent Major**

GPA ≥ 2.0

**Information Science**

At least C in two of MATH 293, COM S 211, ORIE 270. GPA ≥ 2.3 in completed required courses, which must be taken at Cornell.

**Materials Science and Engineering**

At least C- in physics and chemistry courses. At least C in ENGRD 261 or ENGRD 262.

**Mechanical Engineering**

At least C- in math and science courses and in ENGRD 202.

**Mechanical Engineering Research and Engineering**

At least C- in MATH 191, 192, ENGRD 270. GPA ≥ 2.0 in math, science, and engineering courses (both overall and in the term immediately before affiliation).

**SPECIAL PROGRAMS**

**Dual-Degree Program**

The dual-degree program, intended for superior students, allows both a bachelor of science and either a bachelor of arts (B.A.) or bachelor of fine arts (B.F.A.) degree to be earned in about five years. Students registered in the College of Engineering, the College of Arts and Sciences, or the College of Architecture, Art, and Planning may apply and, after acceptance of their application, begin the dual-degree program in their second or third year. For information, contact the appropriate coordinators of dual-degree programs at 55 Goldwin Smith Hall (for Arts and Sciences), B-1 West Shirley (for Architecture, Art, and Planning), and Engineering Advising, 167 Olin Hall.

**Double Major in Engineering**

The double-major option, which makes it possible to develop expertise in two allied engineering majors, generally requires at least one semester beyond the usual four years. Students affiliate with one major following normal procedures and then petition to enter
a second major before the end of their junior year. All requirements of both majors must be satisfied. Further information is available from Engineering Advising, 167 Olin Hall, and the individual major offices.

Independent Major
Students whose educational objectives cannot be met by one of the regular majors may affiliate with the independent major. Often, the desired curriculum is in an interdisciplinary area.

This major consists of an engineering major (≥ 32 credits), which may be any subject area offered by the schools or departments of the college, and an educationally related minor (≥ 16 credits), which may be in a second engineering subject area or in a logically connected nonengineering area. The combination must form an engineering of the college, and an educationally related minor (a second engineering subject area or in a logically connected nonengineering area). The combination must form an engineering major and a second major before the end of their junior year. All requirements of both majors must be satisfied. Further information is available from Engineering Advising, 167 Olin Hall, and the individual major offices.

Independent Major
Students whose educational objectives cannot be met by one of the regular majors may affiliate with the independent major. Often, the desired curriculum is in an interdisciplinary area.

This major consists of an engineering major (≥ 32 credits), which may be any subject area offered by the schools or departments of the college, and an educationally related minor (≥ 16 credits), which may be in a second engineering subject area or in a logically connected nonengineering area. The combination must form an engineering major and 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.

Engineering Minors and Options
Most of the majors have a corresponding minor, requiring six courses (18 credits), in which the student can pursue a second interest. Besides, there are minors in Applied Mathematics, Biomedical Engineering, Civil Infrastructure, Engineering Management, Engineering Statistics, Industrial Systems and Information Technology, and Information Science. There is also the Bioengineering option, which requires only four courses (12 credits) plus a seminar. See the section “Engineering Minors and Options.”

Department of Biomedical Engineering
270 Olin Hall
The charge of the new Department of Biomedical Engineering (BME) is to bridge engineering, biology, and medicine. Students are educated to convert basic discoveries in biology and medicine into medically useful devices and therapies to improve human health. Biomedical engineers also contribute to biological discovery. The 30 faculty in the Biomedical Engineering faculty represent 12 departments and six colleges (including Weill Medical College). The BME field offers research opportunities in biomedical mechanics, biomaterials, drug delivery, design, production, and metabolism, biomedical instrumention and diagnostics, and system biology.

The Department of BME administers the undergraduate minor in Biomedical Engineering, the Biomedical Engineering graduate field, the M.S./Ph.D. degree programs, and the M.Eng. (BME) degree.

Engineering Communications Program
The Engineering Communications Program (ECP), created in 1987 at the urging of the College of Engineering faculty and employers of Cornell engineers, 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, do library and Internet research on engineering topics, and study real engineering situations in which ethics may have been breached.

Enrollment in ECP courses is 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.

Engineering Diversity Office
146 Olin Hall, 255–0735
The Engineering Diversity Office (EDO) operates programs at all levels to facilitate the recruitment and retention of women and minority students in Engineering. EDO acts as a catalyst for the support, career placement, graduate school preparation, and overall success of women and minority students. EDO participates in a university-wide pre-freshman summer program. EDO also provides developmental and specialized instruction each semester in subjects such as math, computer science, and English composition. Field trips and recreational activities provide opportunities for getting a better understanding of how to navigate and adapt to the college. Seminars, lectures, and workshops provide a wide range of topics that are relevant to academic and extracurricular life in the university setting.

In September and April, EDO sponsors a networking event that allows company representatives from all over the United States to meet students from historically underrepresented populations. Summer internships and permanent jobs frequently result from this event.

Learning Initiatives for Future Engineers
The office of Learning Initiatives for Future Engineers, or LIFE, offers programs designed to enhance the undergraduate academic experience through peer education, cooperative learning, and research opportunities.

LIFE’s Academic Excellence Workshops (AEWs) are taken in conjunction with core engineering courses in math, computer science, and chemistry. The 1-credit AEWs are weekly two-hour peer-led learning sessions. Designed to enhance student understanding, they feature peer-facilitated group work that is at or above the level of course material.

LIFE’s Undergraduate Research program provides 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.

Through LIFE’s Tutors-on-Call program, peer tutors are available free of charge to provide one-on-one tutoring assistance for many first- and second-year core engineering courses.

Engineering Cooperative Education and Career Services
This office assists engineering students (freshmen through Ph.D.) in career development and job search issues and administers the Engineering Cooperative Education Program. Individual advising and group seminars are available, and more than 200 national employers typically visit the office annually to recruit technical students and graduates; additional job opportunities are posted electronically. Both undergraduate and graduate students can use these resources to pursue permanent, summer, or co-op employment, but 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 industry and other engineering-related enterprises before they graduate. By supplementing course work with carefully monitored, paid jobs, co-op students are able to 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 at Cornell for four semesters, with a GPA ≥ 2.7. (Students in Computer Science and Biological and Environmental Engineering are eligible, even though they may not be registered in the College of Engineering.) Applicants interview with participating employers. Students who receive offers and join the program usually take their fifth-term course work at Cornell during the summer after their sophomore year and begin the first co-op work period the following fall. They return to Cornell to complete the sixth semester with their classmates, complete a second work period with the same employer the following summer, and return to campus for their senior year to graduate on schedule with their class.

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. In keeping with the university goals of internationalizing the curriculum, the College of Engineering encourages students to study or work abroad during their undergraduate years. For information on these and other opportunities to add an international dimension to your undergraduate education, visit Engineering Advising, 167 Olin Hall, or information on an international co-op work experience, visit the Engineering Cooperative Education and Career Services office, 201 Carpenter Hall.
Students who plan to study abroad apply through Cornell Abroad; please see the Cornell Abroad program description in the introductory section of Courses of Study.

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 the section "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 the section "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 freshmen 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-term 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 191 (or 190), 192 are required.

First-term math (MATH 191). 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-term math.

First-year math (through MATH 192). AP credit may be earned by:
- a passing score on the Cornell departmental exam for first-year math.

Physics: PHYS 112 and 213 are required.

PHYS 112. 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 only if the student has at least one semester of AP or transfer credit in first-term math at the time of matriculation, or
- a passing score on the Cornell departmental exam for PHYS 112.

Note: Students who have received credit for PHYS 112 may not enroll in PHYS 213 unless concurrently enrolled in MATH 293.

PHYS 213. Students receiving a "5" on the Electricity and Magnetism portion of the AP C exam may choose to accept AP credit for PHYS 213 or to enroll in PHYS 213 with no AP credit.

PHYS 116, 217, and 218 (honors sequence). This sequence is designed for students with strong experience in physics and calculus, e.g., "5"s on one or both Physics C AP tests and the equivalent of at least one semester of university calculus. Students interested in PHYS 217 or 218 are strongly advised to start with PHYS 116. Even for a student with "5"s on both Physics C AP tests, 116 will not be boring. Students cannot simultaneously receive credit for PHYS 116 and AP credit for PHYS 112, or credit for PHYS 217 and AP credit for PHYS 213. For advice or more information, contact the departmental representative at 255-6036.

Chemistry: CHEM 207 or CHEM 211 is required.

CHEM 207 or CHEM 211. AP credit 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 207 and who are considering a major in Chemical Engineering or Materials Science and Engineering should consider enrolling in CHEM 215. Those who are offered AP credit for CHEM 207 and then elect to take CHEM 215 will also receive academic credit for CHEM 207. You may want to discuss this option with your faculty adviser.

Computing: COM S 100 is required. AP credit may be earned by:
- a score of "5" on the CEEB A or a score of "4" or "5" on the AB exam, or
- a passing score on the Cornell departmental exam for COM S 100.

Biology: Biology is not required, 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;
- 6 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 Sinton 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 the 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.

Modern 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 are entitled to 3 credits. To qualify for the CASE exam, the student must score at least 650 on a college placement test (taken either in high school or at Cornell during Orientation Week). A score of "2" on the CASE entitles the student to 3 credits; a score of "3," 6 credits; which are equivalent to two courses. Modern language AP credits may be used to satisfy the foreign language category of the liberal studies distribution or may meet an approved elective requirement, contingent on discussions with the faculty adviser.

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.
Transfer Credit for First-Year and Continuing Students

Undergraduate students who have completed courses at recognized and accredited colleges may, under certain conditions, have credits for such courses transferred to Cornell. Such courses must represent academic work in excess of that required for the secondary school diploma and must be documented as such in writing by the secondary institution. Courses deemed acceptable for transfer credit must be equivalent in scope and rigor to courses at Cornell. Transfer credit will not be awarded for courses taken during a semester in which the student is enrolled at Cornell.

- To apply for transfer credit, submit a Transfer Credit Form (one form for each course), accompanied by a course description. (Forms are available from Engineering Advising or the Registrar’s Office and should be submitted before enrollment.) An official transcript from the offering institution (bearing the institutional seal and registrar’s signature) must be sent to the Engineering Registrar’s office before official transfer credit will be awarded.

- Applications for transfer credit to satisfy requirements in math, science, engineering courses, or first-year writing seminars require approval from the department offering an equivalent course at Cornell. The department may require course materials, textbooks used, etc., in addition to the course description before approving the course.

- Departmental approval is not required for transfer credit that satisfies liberal studies distribution requirements. The course will be reviewed for approval by a representative of the Committee on Academic Standards, Petitions, and Credit (ASAPC) in Engineering Advising.

- Cornell does not award credit for courses in which a student has earned a grade less than C. schools and departments may stipulate a higher minimum grade.

- College courses completed under the auspices of cooperative college and high school programs will be considered for advanced placement credit only if students demonstrate academic proficiency by taking the appropriate AP or Cornell departmental placement examination, as described in the “Advanced Credit” section.

- Following matriculation, students may apply up to 18 credits of transfer and/or Cornell extramural credit toward B.S. degree requirements.

- At most 72 total transfer credits (taken both before and after matriculation) may be used to meet graduation requirements.

- Summer session courses taken at Cornell are not considered transfer credit.

A more detailed description of the college’s regulations governing transfer credit 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.

Transfer Credit for Transfer Students

Transfer students may transfer up to 36 credits for each year spent in full-time study at another institution, provided that the courses are acceptable for meeting graduation requirements. Transfer credit is determined by the majors.

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 actually means depends on the major.

Requirements for freshman engineering students to be in good standing at the end of the first semester are as follows. Failure to meet these standards will result in a review by the Committee on Academic Standards, Petitions, and Credit (ASAPC), and the actions of warning, stern warning, required leave of absence, or withdrawal from the College of Engineering may be taken.

1. At least 12 credits passed, including at least two courses from math, science, and/or engineering (phys. ed. courses and courses below the 100 level do not count)
2. At least C- in the math course
3. Semester GPA ≥ 2.0
4. No F, U, or INC grades

Requirements for unaffiliated second-semester freshmen and sophomores to be in good standing are as follows. Failure to meet these requirements will result in a review by the Committee on Academic Standards, Petitions, and Credit (ASAPC), a warning, stern warning, required leave of absence, or withdrawal from the College of Engineering may result.

1. At least 14 credits passed in courses that meet B.S. degree requirements, normally at least two math, science, or engineering courses (phys. ed. courses and courses below the 100 level do not count)
2. At least C- in a math course, if one was taken
3. Semester GPA ≥ 2.0
4. No F, U, or INC grades

Academic Progress

The total number of credits required for graduation range from 123 to 133, 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.

<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 credits</td>
</tr>
<tr>
<td>Chemistry</td>
<td>B</td>
<td>4 credits (CHEM 207)</td>
</tr>
<tr>
<td>Mathematics</td>
<td>A, B, or C</td>
<td>4 credits (MATH 191-190)</td>
</tr>
<tr>
<td>Physics</td>
<td>A or B</td>
<td>4 credits for PHYS 112; 4 additional credits for PHYS 213 are granted to a combination of grades of A or B and a minimum of 4 Advanced Placement (or advanced standing) credits in mathematics.</td>
</tr>
</tbody>
</table>

International Baccalaureate (IB) Higher Level Examination

<table>
<thead>
<tr>
<th>Subject</th>
<th>Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>7</td>
<td>8 credits</td>
</tr>
<tr>
<td>Chemistry</td>
<td>6 or 7</td>
<td>4 credits (CHEM 207 or CHEM 211)</td>
</tr>
<tr>
<td>Computer</td>
<td>6 or 7</td>
<td>4 credits (COM S 100)</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6 or 7</td>
<td>4 credits (MATH 191-190)</td>
</tr>
<tr>
<td>Physics</td>
<td>6 or 7</td>
<td>4 credits (PHYS 112)</td>
</tr>
</tbody>
</table>

Note: Advanced placement credit based on GCE or IB results may also be awarded for courses that satisfy the liberal studies requirement in the College of Engineering. In such cases, the College of Engineering follows the AP guidelines found earlier in this publication under "General Information."
Dean’s List

Dean’s List citations are presented each semester to engineering students who have exemplary academic records. The dean of the college determines the criteria for this honor. For 2004-2005, the requirement is a semester GPA ≥ 3.4 (without rounding); no failing, unsatisfactory, missing, or incomplete grades (even in physical education); and at least 12 letter-grade credits (not S-U). Students may earn Dean’s List status retroactively if they meet these criteria after making up incomplete grades. Students who earn Dean’s List status receive certificates from the Engineering Registrar’s Office, and the honor is noted on the transcript.

Graduating with Distinction and Honors

Graduating with Distinction

Meritouous students graduating with a B.S. degree from the College of Engineering may also be designated cum laude, magna cum laude, or summa cum laude:

- Cum laude will be awarded to engineering students with a GPA ≥ 3.5. Cum laude will also be awarded to engineering students who received a semester GPA ≥ 3.5 in each of the last four semesters at Cornell; in each of these semesters, at least 12 letter-graded credits must be taken with no failing, unsatisfactory, missing, or incomplete grades. If the student is an engineering co-op student, then the engineering co-op summer term will count as one of the last four. Students who were approved for pro-rated tuition in their final semester will be awarded cum laude if they received a semester GPA ≥ 3.5 in their last semester and meet the conditions above in the prior four semesters.
- Magna cum laude will be awarded to engineering students with a GPA ≥ 3.75 (based on all credits taken at Cornell).
- Summa cum laude will be awarded to engineering students with a GPA ≥ 4.0 (based on all credits taken at Cornell).

Note: All GPA calculations are minimums and are not rounded.

Major Honors Program

To be eligible for major honors, a student must enter a major with and maintain a cumulative GPA ≥ 3.5. If the major has an approved honors program and both the GPA and program requirements are fulfilled, the faculty of the major may recommend that a student graduate with the additional diploma and transcript notation of “With Honors.” For more information, see the section “Engineering Majors.”

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 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 adviser-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 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. Grading options may be changed, however, by submitting a properly completed Add/Drop Form to the Engineering Registrar by the end of the third week of classes. After this deadline, the grading option may not be changed, nor will a student be permitted to add a course in which he or she was previously enrolled (in the current semester) under a different grade option.

Residence Requirements

Candidates for an undergraduate degree in engineering must spend at least four semesters or an equivalent period of instruction as full-time students at Cornell. They must also spend at least three semesters of this time affiliated with a major.

Students on a voluntary leave of absence are permitted to register for courses extramurally only with the approval of their major (or the college, for unaffiliated students). No more than 18 credits earned through extramural study or acquired as transfer credit (or a combination thereof) after matriculation may be used to satisfy the requirements for the B.S. degree in engineering. Students may not complete their last semester extramurally.

Degree candidates may spend periods of time studying away from the Cornell campus with appropriate authorization. Information on programs sponsored by other universities and on procedures for direct enrollment in foreign universities is available at the Cornell Abroad Office, 474 Uris Hall. Programs should be planned in consultation with the staff of Engineering Advising, who can provide information on credit-evaluation policies and assist in the petitioning process.

Transferring within Cornell

It is not uncommon for students to change their academic or career goals after matriculation in one college and decide that their needs would be better met in another college at Cornell. While transfer between colleges is not guaranteed, efforts are made to assist students in this situation.

The office responsible for assisting students with the transfer process is the Internal Transfer Division Office. Students who wish to transfer out of the College of Engineering to another college at Cornell should consult initially with Engineering Advising.

Students who wish to transfer into the College of Engineering can apply at Engineering Advising—application forms are available in 167 Olin Hall. It is preferred that students apply in the semester in which they are completing affiliation criteria for the desired major. Students who would enter the college as a second-semester sophomore or later must be accepted by a major as part of the admission process. Students who would enter as a second-semester freshman or first-semester sophomore may be accepted into the college without the requirement of major affiliation but must be sponsored by a major.

Students who wish to transfer into engineering should take courses in math, chemistry, computer science, physics, and engineering that conform to the requirements of the Common Curriculum. Students should discuss their eligibility with an adviser in Engineering Advising, 167 Olin Hall.

Leave 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 granted a "conditional leave." This requires them to meet specific conditions, established at the time the leave is granted, before they will be reinstated.

Leaves of absence generally are not granted for more than two years. A leave of absence granted during a semester goes into effect on the day it is requested and lasts for a minimum of six months. If a leave is requested after the twelfth week of a semester, the courses in which the student was registered at the time of the request are treated as having been dropped (i.e., a “W” will appear on the transcript for each course). Students who owe money to the university are ineligible for leaves of absence. If courses taken during a leave are to satisfy Cornell degree requirements, they must be approved in advance through a formal transfer petition. (See previous section, “Transfer Credit.” For details.) Students who intend to take a leave of absence should check with the Office of Financial Aid and Student Employment to discuss financial implications; this is especially true for those who have taken out 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 granted for at least six months and up to two years with the understanding that the student may return at the beginning of any term 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 where the academic progress of a student is so poor that continuing into the next semester does not appear prudent. An example where a leave of absence would be required 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 not offered 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 return to Engineering Advising; affiliated students should contact their major office. This must be done at least six weeks before the beginning of the semester in which the student wishes to return. The letter should describe the student's activities while away from Cornell, detail any academic work completed during this time, and specify the courses the student intends to take upon return.

Withdrawal from the College
A withdrawal from the College of Engineering may be voluntary or required. Following is a description of each:

Voluntary withdrawal: Students who voluntarily withdraw from the college sever all connection with the college. Unaffiliated students who wish to withdraw should do so through Engineering Advising. Affiliated students should contact their major office. If a withdrawal is requested during the semester, courses in which the student is enrolled must be dropped in accordance with applicable regulations.

A student who fails to register in the first three weeks of the semester, without benefit of a leave of absence or permission for study in absentia, will be deemed to have withdrawn. Students who withdraw from the College of Engineering are eligible to apply for admission to one of the other six colleges at Cornell. The 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 ≥ 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. An honors program student must enter with and maintain a cumulative GPA ≥ 3.5. If the GPA drops below 3.5, the student is dropped from the honors program.

Courses taken to satisfy the honors requirement may not be used to satisfy B.S. degree requirements. At least 9 extra credit hours are required, and a student must be in the program for at least two semesters before graduation.

No research, independent study, or teaching for which the student is paid may be counted toward the honors program.

Procedures
An applicant to the honors program in a major must have an honors adviser, a faculty member from that major who will supervise the honors program and direct the research or project. The honors adviser need not be the student's adviser in the major.

The application for the honors program should be a letter from the student that describes the proposed honors program in detail and includes the explicit approval of the honors adviser.

Students must complete a written application no later than the beginning of the first semester of their senior year, but they are encouraged to make arrangements with the honors adviser during the second semester of their junior year. Each major may place further constraints on timing.

Major-Specific Information
Each major defines the content of the honors program and may also place other requirements on the program, in terms of timing, content, and procedures. Information is given within the description of the individual majors.

BIological ENGINEERING
Offered by the Department of Biological and Environmental Engineering

Contact: 207 Riley-Robb Hall, 255–2173, www.bee.cornell.edu

This major is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). Biological and Environmental Engineering (BEE) addresses three great challenges facing humanity today: ensuring an adequate and safe food supply in an era of expanding world population; protecting and remediating the world's natural resources, including water, soil, air, biodiversity, and energy; and developing engineering systems that monitor, replace, or intervene in the mechanisms of living organisms. The Biological Engineering major has a unique focus on biological systems, including the environment, which is realized through a combination of fundamental engineering sciences, biology, engineering applications and design courses, and liberal studies.

An option in Environmental Engineering is discussed further below.

Students interested in the BEE major should have a strong aptitude for the sciences and math and an interest in the complex social issues that surround technology.

Students take courses in math, statistics, computing, physics, chemistry, basic and advanced biology, fundamental engineering sciences (mechanics, thermodynamics, fluid mechanics, and transport processes), and engineering applications. Students select upper-level engineering courses in subjects that include bioprocessing, soil and water management, biotechnology applications, bioinstrumentation, engineering aspects of animal physiology, environmental systems analysis, and waste treatment and disposal.

Students may further strengthen their programs by completing a minor or a second engineering major. Students planning for medical school also take additional lab-based courses in biology, biochemistry, and organic chemistry. Throughout the curriculum, emphasis is placed on communications and teamwork skills, and all students complete a capstone design project.

Career opportunities cover the spectrum of self-employment, private industry, public agencies, educational institutions, and graduate and professional programs in engineering and science, as well as professional fields like medicine, business, and law. In recent years, graduates have developed careers in environmental consulting, biotechnology, the pharmaceutical industry, biomedical engineering, management consulting, 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 and technical people who have studied biology and the environment, 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. This major is designed to educate the next generation of engineers to meet these challenges.
The major program requirements for students affiliating with the program in 2004–2005 are outlined below.

**Basic Subjects**  
**Credits**

- MATH 191 (or 190), 192, 293, 294  
- Calculus for Engineers and Engineering Mathematics 16
- PHYS 112, 213 8
- General Chemistry (207 or 211 or 215)* 4
- Organic Chemistry (257 or 357)* 3
- BEE 151, Introduction to Computing or COM S 100 4
- Biological Sciences* 15
- Introductory (BIO G 101–104 recommended) 6-8
- Biochemistry or Microbiology 4-5
- BIO XXX Biological science course(s) ≥ 200 3-5

**Major-required courses**

- BEE 200, The BEE Experience or ENGRG 150 1
- ENGRD 202, Mechanics of Solids 4
- BEE 251 or BEE 260, ENGR Applications 3
- BEE 350, Biological and Environmental Transport Processes 3
- BEE 222 or M&AE 221, Thermodynamics 3
- Engineering Statistics and Probability (ENGRD 270 or CEE 304) 3
- Fluid Mechanics (CEE 331 or M&AE 323 or CHEME 323) 3-4
- Upper-level BEE courses (3 courses numbered 450–499; at least one of these must be an approved capstone design course) 9
- Major-approved electives and electives outside the major (200 level or above; at least one must be an approved laboratory experience course; at least one must be a BEE capstone course) 18-19
- Liberal studies (two first-year and six liberal-studies electives) 24
- Adviser-approved electives 6
- Total (minimum) 126

*Basic accredited curriculum. Specializations (options or preprofessional studies) may be accommodated by selecting additional courses in the indicated area(s).

**Biological 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 “Undergraduate Majors” as well as the following requirements.

The 9 credits beyond the B.S. degree requirements shall be drawn from the following, with at least 4 credits in the first category:

1. A significant research experience or honors project under the supervision of a BEE faculty member using BEE 499, Undergraduate Research. 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 498, 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 400+ and graduate level.

**Option in Environmental Engineering**

The Environmental Engineering Option provides BEE majors the opportunity to follow a structured environmental engineering concentration. Students complete a prescribed program of courses within the framework of the B.E. curriculum.

Chemistry/microbiology: Students must take at least two semesters of chemistry (CHEM 211/257 or CHEM 207/208). They must also satisfy the B.E. organic chemistry requirement either by taking organic chemistry as one of the two required chemistry courses (i.e., CHEM 257) or by taking CEE 451. The microbiology requirement of the Environmental Engineering option can also be met by taking CEE 451.

Chemistry: CHEM 211/257 or CHEM 207/208
Organic Chemistry: CHEM 257 or CEE 451
Microbiology: CEE 451 or BIOM 290
Fluid Mechanics: CEE 331
Probability and Statistics: CEE 304
Environmental Quality Engineering: CEE 351
Environmental Engineering Lab: CEE 453
Environmental Engineering: BEE 473 or 475: Watershed Engineering or Environmental Systems Analysis

**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 208 during the freshman year. The program for the last three years is as follows:

**Semester 3**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 293, Engineering Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 213, Electricity and Magnetism</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 389, Physical Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>ENGRD 219, Mass and Energy Balances</td>
<td>3</td>
</tr>
<tr>
<td>Humanities or social sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

**Semester 4**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 294, Engineering Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 323, Fluid Mechanics</td>
<td>4</td>
</tr>
</tbody>
</table>

**CHEM 290–391, Physical Chemistry (field) | 6       |

**Biology elective**

**Humanities or social sciences**

**Semester 5**

**CHEM 357, Organic Chemistry for the Life Sciences**

**CHEM 251, Organic Chemistry Laboratory**

**CHEM 313, Chemical Engineering Thermodynamics**

**CHEM 324, Heat and Mass Transfer**

**Humanities or social sciences**

**Semester 6**

**Advanced science elective**

**CHEM 301, Nonresident Lectures**

**CHEM 332, Analysis of Separation Processes**

**CHEM 372, Introduction to Process Dynamics and Control**

**CHEM 390, Reaction Kinetics and Reactor Design**

**Humanities or social sciences**

**Semester 7**

**CHEM 422, Chemical Engineering Laboratory**

**Electives**

**Humanities or Social Sciences**

**Semester 8**

**CHEM 462, Chemical Process Design**

**Humanities or social sciences**

**Electives**

**Approved elective**

*The electives in semesters 7 and 8 comprise 6 credits of major-approved electives and 6 credits of advanced CHEM electives. Advanced CHEM electives include any CHEM course at the 400+ level except CHEM 400, 490, 491, 492, 493, 494, and 499.

Advanced science electives include: BIOM 290, General Microbiology Lectures; BIOM 330, 351, 352, and 353, Principles of Biochemistry; BMPE (CHEM) 401, Molecular Principles of Biomedical Engineering; BMPE (CHEM) 402, Cellular Principles of Biomedical Engineering, CEE 451, Microbiology for Environmental Engineering, CEE 654, Aquatic Chemistry; CHEM 470, Process Control Strategies; CHEM 480, Chemical Processing of Electronic Materials; CHEM 481, Biomedical Engineering; CHEM 484, Microchemical and Microfluidic Systems; CHEM 488, Polymer Materials; CHEM 543, Bioprocess Engineering; CHEM 601, Air Pollution Control; FOOD 417, Food Chemistry I; M&AE 423, Intermediate Fluid Dynamics; MS&EE 206, Atomic and Molecular Structure of Matter; MS&T 305, Electronic Structure of Matter; MS&T 306, Electrical, Optical, and Magnetic Properties of Materials; MS&T 521, Properties of Solid Polymers; MS&EE 531, Introduction to Ceramics; MS&EE 541, Microscopy of Materials; T&AM 310, Advanced Engineering Analysis I; any A&EP course numbered 333 or above; any CHEM course numbered 401 or above; any PHYS course numbered 500 or above.
CIVIL ENGINEERING
Offered by the School of Civil and Environmental Engineering
Contact: 221 Hollister Hall, 255–3412, www.cee.cornell.edu
This major is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).
While it is not necessary to do so, students may concentrate in civil infrastructure, fluid mechanics and hydrology, geotechnical engineering, structural engineering, transportation, or water resource systems.

Admission Requirements
Students planning to affiliate with this major must complete ENGRD 202, Mechanics of Solids, by the end of the first semester of the sophomore year with at least C–.

Engineering Distribution Courses
Majors are required to take ENGRD 202, Mechanics of Solids, as an engineering distribution course. For the second engineering distribution course, one of the following is recommended:
ENGRD 261, Introduction to Mechanical Properties of Materials, for students interested in structural engineering or civil engineering materials, strongly recommended for those concentrating in civil infrastructure.
ENGRD 201, Introduction to the Physics and Chemistry of the Earth, for students interested in geotechnical engineering.
ENGRD 221, Thermodynamics, for students interested in fluid mechanics and hydraulics/hydrology.
ENGRD 211, Computers and Programming, for students interested in transportation.

Major Program
Students may substitute CHEM 208 for PHYS 214. The following nine courses are required in addition to those required for the Common Curriculum.

Core Courses Credits
ENGRD 203, Dynamics, or CEE 478, Structural Dynamics 3
ENGRD 241, Engineering Computation* 3
CEE 304, Uncertainty Analysis in Engineering 3
CEE 323, Engineering Economics and Management 3
CEE 331, Fluid Mechanics 4
CEE 341, Introduction to Geotechnical Engineering and Analysis 4
CEE 351, Environmental Quality Engineering** 3
CEE 361, Introduction to Transportation Engineering** 3
CEE 371, Modeling of Structural Systems 4
Additional requirements include a set of two major-approved electives and three design electives from a list of approved courses that is available in the school office. In addition, students must complete one technical communications course from among the courses designated ENGRG or approved communications courses. If the technical communications course is taken as an expressive art, then an additional approved elective must be taken from a department or school other than Civil and Environmental Engineering.
ENGRD 241 can be used to satisfy a major requirement if a student elects to use this course as a second distribution course, the student must take an additional major-approved elective to fulfill the core course requirements.
ENGRD 270 may be accepted (by petition) as a substitute for CEE 304 in the major, but only if ENGRD 270 is taken before affiliation, or in some special cases where co-op or study abroad programs necessitate such a substitution.
**Students may substitute any major-approved elective for either CEE 351 or CEE 361, if they complete either CEE 376 or CEE 472 and also complete CEE 473. However, this substitute course then counts as a core course only and not as one of the required five CEE design courses and major-approved electives.

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 “Undergraduate Majors” as well as the following requirements.
The 9 credits beyond the B.S. degree requirements shall be drawn from the following components:
1. A significant research experience or honors project under the direct supervision of a CEE faculty member using CEE 400: 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 grade 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 470, Peer Teaching in Engineering, or CEE 401, Undergraduate Teaching in CEE (1–3 credits per semester).
3. Advanced or graduate courses at the 500 level or above. The minimum number of credits in any component included in a program should be 2.

Procedures
Application to the program shall be a registration form for CEE 400 and a letter from the student describing the specific proposed honors program and including the explicit approval of the major adviser and the honors adviser. The 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.

ENGINEERING - 2004–2005

COMPUTER SCIENCE
Offered by the Department of 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.
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:
• four semesters of calculus (MATH 191–192–293–294)
• two semesters of introductory computer programming (COM S 100 and ENGRD 211)
• a 1-credit project (COM S 212)
• a seven-course computer science core (COM S 280, 312, 314; one of 321, 322, 421, or 428; 381, 414, and 492)
• two 400+ level computer science electives, totaling at least 6 credits
• a computer science project course (COM S 413, 415, 419, 427, 435, 466, 473, 501, 514, or 604)
• a math elective course (e.g., ENGRD 270, MATH 300+, T&AM 310)
• two 300+ level courses (major-approved electives) that are technical in nature and total at least 6 credits
• three courses in a topic area other than computer science, all numbered 300 level or greater
All the major electives described above must be courses of at least 3 credits, with the exception of the COM S 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 adviser, 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 "Undergraduate Majors" with a set of coherent courses and research activities that satisfy the following requirements:

1. at least one COM S course (at least 3 credit hours) at or above the 500 level with at least A– (no seminars or 2-credit project courses)
2. at least two 3-credit semesters of COM S 490 (independent research), with at least A– 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: 223 Phillips Hall, 255-4309, www.ece.cornell.edu

This major is accredited under the title “Electrical Engineering” by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

The Electrical and Computer Engineering major, 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, optimization, numerical and state-space methods; communications, computer networks, information theory and coding, signal processing, electronic circuits, VLSI, solid state physics and devices, MEMs, nanotechnology, lasers and optoelectronics; electromagnetics, radiophysics, space sciences, plasmas.

Students planning to affiliate with ECE must take ENGRD 230 as an engineering distribution course. Prospective majors are encouraged, but not required, to take ENGRD 211 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 210, ECE 220, ENGRD 230, CS/ECE 314, and ECE 315 are taught in both the fall and spring semesters.

Course Credits

Major-required courses

ECE/ENGRD 210, Introduction to Circuits for Electrical and Computer Engineers 4

ENGRD 230, Introduction to Digital Logic Design 4

ECE 220, Signals and Information 4

ECE 303, Electromagnetic Fields and Waves 4

ECE/COM S 314, Computer Organization 4

ECE 315, Introduction to Microelectronics 4

ECE 302, Systems and Networks 4

Major-Approved Electives

(32-credit minimum in the following categories)

Advanced ECE electives*: (6 lecture courses)

Outside ECE electives**: 9 minimum credits

Total minimum major credits 55

ECE 310 can be taken in place of ENGRD 270 or ENGRD 310 to satisfy the college application of probability and statistics requirement.

These electives must include two 400-level electrical and computer engineering culminating design experience (CDE) courses and at least two additional courses at the 400 level or above. The remaining electives may not include independent project courses, such as ECE 391, 392, 491, or 492, and must be at the 300 level or above in Electrical and Computer Engineering.

Courses that meet the CDE requirement are described in the Engineering Undergraduate Handbook. The list is dynamic and changes frequently. Always refer to the latest information in the Electrical and Computer Engineering Web Handbook. All courses must have a college-level prerequisite.

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 300-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 B.S. degree means that an honors degree requires at least 137 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 of research or development in applied science or advanced technology and engineering. Its distinguishing feature is a focus on the physics and math fundamentals, both experimental and theoretical, that are at the base of modern engineering and research and have a broad applicability in these areas. By choosing areas of concentration, the students may combine this physics base with a solid 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 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 our graduates go on for advanced study in all areas of basic and applied physics as well as in a diverse range of areas in advanced science and engineering. Examples include applied physics, astrophysics, atmospheric sciences, biophysics, cell biology, computer science and engineering, electrical engineering, environmental science, fluid mechanics, geotechnology, laser optics, materials science and engineering, mathematics, mechanical engineering, medical physics, medicine, nuclear technology, 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/ A&EP 110, Lasers and Photonics; ENGR/ A&EP 102, Introduction to Nanoscience and Nanotechnology; ENGRD/ A&EP 264, Computer-Instrumentation Design (a recommended sophomore engineering distribution course); A&EP 330, Modern Experimental Optics (a junior/senior course); A&EP 365, Digital Circuits (a sophomore/junior course); PHYS 410, Advanced Experimental Physics; and A&EP 438, 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 112 or 116 during their first semester (if their advanced placement credits permit) and to satisfy the prerequisites to the writing requirement ECE 210 with the engineering distribution course ENGRD 222. EP students need to take only one engineering distribution course, since A&EP 333, taken in the junior year, counts as the second one. EP students are advised to take A&EP 363 (taking ECE 210 and 230). 4 credits each, can satisfy AEP 363. Count ECE 210 as an approved elective and ECE 230 as AEP 363) 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 192 may wish to explore accelerating their math requirements so as to enroll in A&EP 321 and 322 in the sophomore year. For advice on this option, consult with the A&EP 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>A&amp;EP 333, Mechanics of Particles and Solid Bodies</td>
<td>4</td>
</tr>
<tr>
<td>A&amp;EP 355, Intermediate Electromagnetism</td>
<td>4</td>
</tr>
<tr>
<td>A&amp;EP 356, Intermediate Electrodynamics</td>
<td>4</td>
</tr>
<tr>
<td>A&amp;EP 361, Introductory Quantum Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>A&amp;EP 363, Electronic Circuits</td>
<td>4</td>
</tr>
<tr>
<td>A&amp;EP 423, Statistical Thermodynamics</td>
<td>4</td>
</tr>
<tr>
<td>A&amp;EP 434, Continuum Physics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 410, Advanced Experimental Physics</td>
<td>4</td>
</tr>
<tr>
<td>A&amp;EP 321, Mathematical Physics I; or MATH 421 (applied mathematics)</td>
<td>4</td>
</tr>
<tr>
<td>A&amp;EP 322, Mathematical Physics II; or MATH 422 (applied mathematics)</td>
<td>4</td>
</tr>
<tr>
<td>Six major-approved electives (18-23 credits), of which five must be technical upper-level courses (300 or above).</td>
<td></td>
</tr>
</tbody>
</table>

Total major credits=56 credit hours minimum

*The Engineering Common Curriculum allows freshmen to 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 up 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 410 required for the B.S. degree in EP can be satisfied by completing A&EP/PHYS 330 or ASTRO 410. The remaining 2 credits of PHYS 410 can then be satisfied by taking PHYS 400 for 2 credits, provided that the experiments completed in PHYS 400 do not overlap with those in A&EP/PHYS 330 or ASTRO 410. (A list of experiments that are not appropriate will be prepared by A&EP faculty and made available in the A&EP office.) If a student chooses this option, A&EP/PHYS 330 or ASTRO 410 may also count as a technical elective, provided the remaining three technical electives are 4 credits each.

Choosing elective courses. The EP major provides the students with a strong opportunity to develop individualized programs of study to meet their particular educational and career goals. These can include the pursuit of a dual major or the development of 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 adviser to develop a coherent program that is in accordance 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 themselves particularly well for graduate study in any one of a number of fields. Various programs are described in a special brochure available from the School of A&EP, Clark Hall. Students are advised to consult with their EP adviser, 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 (A&EP 490). 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.

Environmental 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 "Undergraduate majors" as well as the following requirements.

1. At least 8 credits of major-approved electives at the 400 level or higher with at least A- in each, not counting credits given for item 2.

2. Two semesters of A&EP 490 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 consistent with the amount of academic credit granted.

Procedures

Before enrolling in A&EP 490 or the equivalent, the honors candidate must submit a brief proposal outlining the topic and scope of the project or thesis and an honors adviser's written concurrence to the associate director for undergraduate studies. This proposal will be reviewed by the A&EP Honors Committee and either approved or returned to the candidate to correct 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 must 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 A&EP 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. 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

To be offered by the School of Civil and Environmental Engineering, pending final approval. A joint offering of this major in the Department of Biological and Environmental Engineering is planned. Until final approval, environmental engineering is offered as a concentration within the existing majors of civil engineering and biological and environmental engineering.

Contact: 221 Hollister Hall, 295–3142, www.cce.cornell.edu

This major is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET) under the title "Civil 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 increased understanding of the interactions among the natural environment, the constructed environment, and human activities.
The major requires a GPA ≥ 2.0 in engineering and science courses, and at least a C- in ENGRD 202, CHEM 257, or ENGRD 251.

Students planning to affiliate with this major should take the following courses:

**Mathematics-science requirements**

MATH 191, 192, 293, 294

PHYS 112, 213

CHEM 207, 257*

CS100 or BEE 151 (computer programming)

**Introduction to engineering**

ENGRD 115 recommended.

**Engineering distribution courses**

ENGRD 251. Engineering for a Sustainable World, is required.

ENGRD 202, 241, or CEE 304 are recommended.

**Major-required courses**

<table>
<thead>
<tr>
<th>Major Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO G 10X Introductory Biology (BIO G 101/103, 105, 107, 109, or 110)</td>
<td>3-4</td>
</tr>
<tr>
<td>ENGRD 202 Mechanics of Solids</td>
<td>4</td>
</tr>
<tr>
<td>ENGRD 241 Engineering Computation**</td>
<td>3</td>
</tr>
<tr>
<td>CEE 304 Uncertainty Analysis in Engineering</td>
<td>4</td>
</tr>
<tr>
<td>CEE 323 Engineering Economics and Management</td>
<td>3</td>
</tr>
<tr>
<td>CEE 331 Fluid Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>CEE 341 Introduction to Geotechnical Engineering and Analysis</td>
<td>4</td>
</tr>
<tr>
<td>CEE 351 Environmental Quality Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEE 451 Microbiology for Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Lab course CEE 453 (fall), BIEE 427 (fall), or CEE 437 (every other spring)</td>
<td>3</td>
</tr>
<tr>
<td>IEE 475 Environmental Systems Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

**Electives**

Technical communications course (ENGRD 335, 350; COMM 260, 263, 252; CEE 453; or BIEE 489) 3-4

Three CEE design electives** 9-12

One major-approved elective†† 6-8

Two approved electives 6

Total credits (minimum) 127

*Substitute CHEM 357 for 257, without petition

†Students using this course as a second engineering distribution must take an additional elective. BIO G 109-110 is not an engineering distribution course.

** If ENGRD 241 is not taken as a distribution course, it must be taken as a major-approved elective.

†† Students planning graduate-level study in EnEV may take BIOM 290, Introduction to Microbiology, in place of CEE 451.

To be chosen from a list of design courses. Students are encouraged to take CEE 352.

The list of suggested courses covers the areas of environmental engineering, hydraulics/hydrology, environmental systems engineering, geotechnical engineering, remote sensing, air pollution and biological and environmental engineering. The list is available at the departmental office.

If the course fulfilling the technical writing requirement also fulfills another requirement (e.g., liberal studies, major-approved elective), then an additional approved elective must be substituted for this requirement.

**Environmental 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 “Undergraduate Majors” as well as the following requirements.

The 9 credits beyond the B.S. requirements shall be drawn from one or more of the following components:

1. A research experience or honors project under the direct supervision of a faculty member using CEE 400, Senior Honors Thesis (1-6 credits per semester). A significant written report or 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 College of Engineering, i.e., ENGRG 470, Peer Teaching in Engineering, or CEE 401, Undergraduate Teaching in CEE (1-3 credits per semester).

3. Course at the 500 level or above. At least 2 credits in any component of the program.

**Procedures**

Each program must be approved by the CEE Curriculum Committee (the committee may delegate approval authority to the associate director for all but unusual proposals).

**Geological Sciences**

Offered by the Department of Earth and Atmospheric Sciences

Contact: 2124 Snee Hall, 255-5460, www.eas.cornell.edu

We live on a planet with finite resources and a finite capacity to recover quickly from human-induced environmental stresses. It is a naturally powerful planet, with natural hazards such as earthquakes, hurricanes, and volcanic eruptions that alter the course of history with little prior warning. As the human population grows, understanding the earth is so pervasive and the earth system is so multifaceted, the major has three options, which cover the spectrum of modern earth sciences.

The three options are the geoscience option, the atmospheric science option, and the science of earth systems (SES) option. The geoscience option emphasizes the structure, composition, and evolution of our planet; the atmospheric science option covers the planetary processes producing weather and climate; and the SES option is concerned with processes on and near the earth's surface where the interactions of water, life, rock, and air produce our planetary environment.

**Geoscience Option**

The geoscience option reveals Earth's turbulent history from the formation of our solar system to the plate tectonic cycles and ice ages that dominate Earth's present behavior. That history is highlighted by the co-evolution of life and the Earth system—from the origin of life to the modern interglacial phase during which our species has proliferated and become able to alter the chemical and physical environment. Topics of study also include the fundamental processes responsible for earthquakes, volcanic eruptions, and mountain building. This option prepares students for advanced study in geology, geophysics, geochemistry, and geobiology and for careers in energy and mineral industries or in water and contaminant investigation (environmental geology). The option is also valuable for a pre-law or pre-med program or in preparation for a career in K-12 education.

The geoscience option stresses a balanced overview of geology with considerable flexibility and a degree of specialization achieved by careful selection of major-approved electives. Students must take ENGRD/EAS 201 as an engineering distribution course. For students interested in geobiology or paleontology, BIO G 101/103-102/104 (or BIO G 109-110) are recommended. CHEM 208 may be substituted for PHYS 214. Learning through direct observation of the natural system is highly valued, akin to design projects in other engineering majors.

The geoscience option requires these courses: the introductory outdoor field course EAS 210 and the five core courses EAS 325, 355, 356, 375, and 388. Two additional EAS major-required courses and at least one major-approved elective must be EAS 300 through 600-level courses. The core courses may be taken in any reasonable sequence, except that EAS 355 (full course) should be taken before EAS 356 (spring course). EAS 325, 355, 356, and 375 should be taken relatively early in the program.

There are four alternatives for completing the required 4-credit advanced outdoor field experience: a) EAS 417 (Field Mapping in Argentina, 3 credits) and EAS 491-492 (1 credit based on field observations), b) EAS 437 (Geophysical Field Methods, 3 credits) plus at least 1 credit of EAS 491 or 492 using geophysical techniques from EAS 437, c) EAS 491–492 (1 undergraduate research, 2 credits each) with a significant component of fieldwork, d) a pre-approved outdoor advanced field course taught by another college or university (2-4 credits). A selection of major-approved electives may provide specialization in geophysics, geochemistry (including petrology and mineralogy), geobiology (palaeontology), and geology applied to mineral and petroleum industries, environmental problems, hydrology, and civil engineering. Students who want a more general background or
want to remain uncommitted with regard to specialty must choose at least two of their major-approved electives from the same department or school. The major-approved electives outside the major may be chosen from offerings in other science or engineering areas or the liberal arts at the 300 level or above. Students may request substitution of EAS 491 and 492. Undergraduate Research, for a fourth-year major-approved elective but not if it is being used to fulfill the outdoor field requirement.

In addition to course work, students learn by involvement in research projects. Facilities include equipment for processing seismic signals and digital images of the Earth’s surface, instruments for highly precise isotope and element analyses, and extensive libraries of earthquake records, satellite images, and exploratory records. Undergraduates have served as field assistants for faculty members and graduate students in South America, Europe, Asia, Canada, the USA, and several ocean islands. Undergraduates are encouraged to participate in research activities, frequently as paid assistants.

**Atmospheric Science Option**

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 analysis, interpretation, and forecasting of meteorological events. This option satisfies both the curricular guidelines of the American Meteorological Society and the educational requirements of the National Weather Service for employment as a meteorologist, which also qualifies graduates for positions in private-sector forecasting and environmental consulting firms. The option also provides excellent preparation for graduate work in atmospheric science and related fields.

The atmospheric science option requires ENGRD 270 as an engineering distribution course as well as introductory courses in atmospheric science (EAS 131 and 133) and EAS 250 (Observations and Instrumentation). Many of the upper-division major courses require EAS 341 (Atmospheric Thermodynamics and Hydrostatics) and EAS 342 (Atmospheric Dynamics) as prerequisites, which are normally taken in the junior year. The additional required major courses are EAS 331 (Climate Dynamics), EAS 352 (Synoptic Meteorology I), EAS 451 (Synoptic Meteorology II), EAS 435 (Statistical Methods in Meteorology), and EAS 447 (Physical Meteorology). Major-approved electives may be chosen from EAS courses and selected upper-division courses in other departments.

**Science of Earth Systems (SES) Option**

The SES option provides an integrated view of Earth processes critical to the understanding of our environment. This scientific understanding is the primary foundation used to determine to what degree human societies can modify or adapt to future change. The option is for students interested in careers or graduate study in any of the Earth system sciences or a future in environmental law, environmental engineering, science teaching, or environmental public policy. The option is part of the multidisciplinary, intercollegiate program in the Science of Earth Systems. Collaborations with other departments provide breadth and depth to the program.

The SES option emphasizes a strong preparation in basic math and sciences and an integrated approach to the study of the Earth system including the lithosphere, biosphere, hydrosphere, and atmosphere. Students are required to take a second semester of chemistry (CHEM 208), three semesters of biology (BIO G 101/103-102/104 or BIO G 109-100; plus BIOEE 261), and ENGRD 201 (Physics and Chemistry of the Earth) as an engineering distribution course.

The option requires a set of three core courses, normally taken in the junior or senior years, that provide breadth and integration. Five additional intermediate to advanced courses are selected—within the adviser's approval—to provide depth and a degree of specialization, and an additional major-approved elective is selected. These courses permit the student to specialize in such areas as climatic dynamics, biogeochemistry, ocean sciences, environmental geosciences, ecological systems, hydrological sciences, and soil sciences.

Two of the specialization courses will count as major-required courses and three as major-approved electives. At least three of the major-approved electives must be non-EAS courses. The three SES core courses are:

- EAS 302 Evolution of the Earth System—spring, 4 credits
- EAS 321 Biogeochemistry (also NTRES 321)—fall, 4 credits
- EAS 331 Climate Dynamics (also ASTRO 331)—fall, 4 credits

See www.eas.cornell.edu for possible specializations.

Excellent opportunities for learning through direct observation of the natural systems exist in either the spring "Environmental Semester in Hawaii" or through a summer field course in geology operated in Argentina (EAS 417), or through campus-based field courses.

**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, 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 SES major include EAS 240, 322, and 351. EAS 322 and 351 may also be used to fulfill requirements of the Geological Sciences major. 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. The EES program is administered by Cornell Abroad. For further information, see www.geo.cornell.edu/geomor/classes/hawaii/course.html.

**Geological Sciences Honors Program**

The B.S. degree with honors is granted to engineering students who satisfy the requirements given at the beginning of the section "Undergraduate majors" as well as the following requirements.

1. Acceptance of the written proposal of the honors project by the faculty adviser, the honors adviser, and the director of undergraduate studies.
2. An honors thesis involving research (EAS 491-492 or 499, 2 or more credits each) of breadth, depth, and quality is required.

**INDEPENDENT MAJOR**

Offered by the Independent Major Committee

Contact: Engineering Advising, 167 Olin Hall, 255-7414

The Independent Major is designed for students whose educational objectives cannot be met by one of the regular majors. With the exception of certain faculty-sponsored programs at the major consists of an engineering major subject (approx. 32 credits) and an educationally related minor subject (approx. 16 credits). The major may be in any subject area offered by schools or departments of the college; the minor may be in a second engineering subject area or in any 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 major and minor subject areas (an adviser 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. 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 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 Industrial 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 confluence of these new technologies demands a new focus in engineering education—one that remains rigorous and technically oriented but is simultaneously devoted to integrating engineering design, theory, and practice within the social and organizational contexts in which these complex digital information systems are employed.

The 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. Students in the Management Science option will obtain advanced training in quantitatively oriented decision making in the information technology arena. 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.

Engineering distribution courses

Majors are required to take ENGRD 270, Basic Engineering Probability and Statistics as an engineering distribution course. ENGRD 211, 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>ORIE 320, Optimization I</td>
<td>3</td>
</tr>
<tr>
<td>ORIE 360, Engineering Probability and Statistics II</td>
<td>3</td>
</tr>
<tr>
<td>INFO 230, Intermediate Design and Programming for the Web</td>
<td>2</td>
</tr>
<tr>
<td>ORIE 311, Information Systems and Analysis</td>
<td>3</td>
</tr>
<tr>
<td>INFO 330, Applied Database Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECON 301 or 313, Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>One of: ILROB 170, Introduction to Micro Organizational Behavior and Analysis</td>
<td>3</td>
</tr>
<tr>
<td>INFO 245, Psychology of Social Computing</td>
<td>3</td>
</tr>
</tbody>
</table>

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.

Requirements for the Management Science option:

1. Four courses from Mathematical Models in Management Science (Area I).
2. Three electives, one from each of:
   - Information Systems (Area II)
   - Mathematical Modeling in IT (Area III)
   - Information Technology Management Solutions (Area IV)
3. Two electives from any of the six areas.

Area I. Mathematical Models in Management Science

| ORIF 350 Financial and Managerial Accounting |
| ORIE 361 Introductory Engineering Stochastic Processes I |
| ORIE 480 Information Technology |
| ORIE 580 Simulation Modeling and Analysis |

Area II. Information Systems

| INFO 430 Information Retrieval |
| INFO 431 Web Information Systems |
| COM S 432 Introduction to Database Systems |
| COM S 465 Computer Graphics I |
| COM S 472 Foundations of Artificial Intelligence |
| COM S 474 Introduction to Natural Language Processing |
| COM S 501 Software Engineering |
| COM S 578 Empirical Methods in Machine Learning and Data Mining |

Area III. Mathematical Modeling in IT

| OR&IE 431 Discrete Models |
| OR&IE 404 Extreme Value Analysis with Applications to Finance and Data Communications |
| OR&IE 474 Statistical Data Mining I |
| COM S 478 Machine Learning |
| OR&IE 483 Applications of Operations Research and Game Theory to IT |
| ECE 562 Fundamental Information Theory |
| OR&IE 574 Statistical Data Mining II |

Area IV. IT Management Solutions

| OR&IE 481 Delivering OR Solutions with Information Technology |
| OR&IE 518 Supply Chain Management |

Area V. Human-Centered Systems

| PSYCH/COGST 342 Human Perceptions: Applications to Computer Graphics, Art, Visual Display* |
| INFO 345 Human-Computer Interaction Design |

Area VI. Social Systems

| SOC 304 Social Networks and Social Processes |
| AEM 322 Technology, Information, and Business Strategy |
| INFO 349 Media Technologies |
| INFO 355 Computers: From Babbage to Gates |
| ECON 368 Game Theory* |
| INFO 387 The Automatic Lifestyle: Consumer Culture and Technology |
| ECON 404 Economics and the Law |
| LAW 410 Limits on and Protection of Creative Expressions—Copyright Law |
| STS 411 Knowledge, Technology, and Property |
| ECON 419 Economic Decisions Under Uncertainty |
| COMM 428 Communication Law |
| INFO 435 Seminar on Applications in Information Science |
| ORIE 435 Introduction to Game Theory* |
| STS 438 Minds, Machines, and Intelligence |
| INFO 447 Social and Economic Data |
| ECON 476/477 Decision Theory I and II |
| INFO 515 Culture, Law, and Politics of the Internet |

* Only one of ECON 368 and ORIE 435 can be taken for ISST credit.

Information Science, Systems, and Technology Honors Program

The B.S. degree with honors is granted to engineering students who satisfy the requirements given at the beginning of the section “Undergraduate Majors” as well as the following requirements:

1. 8 credit hours of ISST course work at or above the 500 level (no SU courses, no seminars or 2-credit courses)
2. 6 credit hours of INFO 490 independent study and research with an ISST faculty member, spread over at least two semesters and with at least A- each semester OR
3. 3 credit hours of INFO 490 independent study and research with an ISST faculty member and 3 credit hours of INFO 491 teaching experience, both with grades of at least A-
The ISST research is expected to result in a programming project or a written report (or both).

Any 500- or 600-level course taken to fulfill the honors requirements may be counted toward fulfillment of the associated primary or secondary option requirements.

Procedures
Each program must be approved by the appropriate co-director of the ISST major, and any changes to the student’s program must also be approved.

Note: Students will not be allowed to double major in ISST and COM S or ISST and OR&IE.

MATERIALS SCIENCE AND ENGINEERING

Offered by the Department of Materials Science and Engineering
Contact: 214 Bard Hall, 255–4135, 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 261 or ENGRD 262 before affiliating with the major. It is strongly recommended that the course be taken as 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 are required to complete a series of electives to develop knowledge of materials, such as biomaterials, ceramics, polymers, and semiconductors. Application-related courses include the 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, 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 261, Mechanical Properties of Materials: From Nanodevices to Superstructures OR ENGRD 262, Electronic Materials for the Information Age
2. 12 required major courses:
   - MS&E 204 Materials Chemistry
   - MS&E 206 Atomic and Molecular Structure of Matter
   - MS&E 302 Mechanical Properties of Materials, Processing, and Design
   - MS&E 303 Thermodynamics of Condensed Systems
   - MS&E 304 Kinetics, Diffusion, and Phase Transformations
   - MS&E 305 Electronic, Magnetic, and Dielectric Properties of Materials
   - MS&E 307 Materials Design Concepts I
   - MS&E 311 Junior Lab I
   - MS&E 312 Junior Lab II
   - MS&E 403/405 Senior Materials Lab I or Senior Thesis I
   - MS&E 404/406 Senior Materials Lab II or Senior Thesis II
   - MS&E 407 Materials Design Concepts II

3. Two materials-related electives covering two groups of different materials
4. Three application-related electives in at least two different types of applications
5. Two of the application-related electives must be taken from outside MS&E
6. One additional technical elective outside MS&E

Materials Science and Engineering Honors Program
The B.S. degree with honors is granted to engineering students who satisfy the requirements given at the beginning of the section “Undergraduate Majors” as well as the following requirements.

1. The 9 credits (giving a total of 140) of additional courses must be technical in nature, i.e., in engineering, math, chemistry, and physics at the 400 and graduate level, with selected courses at the 300 level. The courses must be approved by the major adviser.
2. Senior honors thesis (MS&E 405/406) with a grade of at least A.

MECHANICAL ENGINEERING

Offered by the Sibley School of Mechanical and Aerospace Engineering
Contact: 108 Upson Hall, 255–3573, 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 with which mechanical engineers are concerned. The program covers both major streams of mechanical engineering.

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.

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 and thermo-fluids engineering.

During the fall term, sophomores who plan to affiliate with the Mechanical Engineering major take ENGRD 202 (also TRAM 202) as an engineering distribution course. ENGRD 221/MAE 221 is required for the major and is recommended as the second engineering distribution course. The Sibley School supports students who have unusual requirements, but delays or substitutions must be discussed with and receive approval of their major adviser.

The major requires eleven courses (beyond ENGRD 202 already mentioned) and five major-approved elective courses.

Required courses
- MAE 212, Mechanical Properties and Selection of Engineering Materials
- ENGRD 221, Thermodynamics
- MAE 225, Mechanical Design and Synthesis
- ENGRD 203, Dynamics
- ECE 210, Introduction to Circuits for Electrical and Computer Engineers (PHYS 360 or MAE 378 may be substituted)
- MAE 323, Introductory Fluid Mechanics
- MAE 324, Heat Transfer
- MAE 325, Analysis of Mechanical and Aerospace Structures
- MAE 326, System Dynamics
- MAE 327, Mechanical Property and Performance Laboratory
- MAE 427, Fluids/Heat Transfer Laboratory
- MAE 428, Seminar on Engineering Design

Electives
Students should use the flexibility provided by the major-approved electives, adviser-approved electives, and humanities/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 (300+) MAE courses. Of these three, two must be a concentration of MAE’s upper-level courses. 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:
- Biomechanics, MAE 463, 464, 466, 565
- Engineering Materials, MAE 312, 313, 455, 464, 470, 513
- Mechanical Systems and Design, MAE 378, 409, 415, 417, 470, 477, 478, 479, 514, 525
- Thermo-Fluids Engineering, MAE 423, 449, 453, 501, 543

Students substituting MAE 378 for the required ECE 210 cannot use MAE 378 as a major-approved elective.
Of the three upper-level M&AE courses, one must be an approved design elective. The design offerings may change from year to year. Typically, they include M&AE 401, 412, 426, 441, 470, 479, 486, 491, and 525.

The design elective must be taken during the senior year. A single course may satisfy both the design and concentration requirements, in which case the third course could be any upper-level M&AE course.

One of the courses must be an approved upper-level math course taken after MATH 294. The course must include some statistics. Currently, the approved courses are TAM 310, OR&IE 270, and CEE 394.

One of the major-approved electives may be any course at an appropriate level, chosen from engineering, math, or science (physics, chemistry, or biological sciences). Appropriate level is interpreted as being at a level beyond the required courses of the college curriculum. Courses in economics, business, and organizational behavior are not accepted. Advisers may approve such courses as adviser-approved electives.

**Adviser-approved electives**

To maximize flexibility (i.e., the option for study abroad, COOP, internships, pre-med, and flexibility during the senior years), the Sibley School faculty recommends that students delay use of adviser-approved (AA) electives until after term three. Students must seek adviser approval before taking an AA elective. Advanced placement credit cannot count as an AA elective, nor can Reserve Officer Training Corps (ROTC) courses unless they are co-listed in an academic department. Students must document AA electives approved before M&AE affiliation within a month of registration as an M&AE student. The faculty encourages students to consider the following as possible AA electives:

- an engineering distribution course
- courses stressing oral or written communications
- courses stressing the history of technology
- rigorous courses in the physical sciences (physics, biology, chemistry)
- courses in information science (mathematics, computer science)
- courses in methodologies (modeling, problem solving, synthesis, design)
- courses in technology (equipment, machinery, instruments, devices, processes)
- courses in business enterprise operations (e.g., economics, financial, legal)
- courses in organizational behavior
- courses in cognitive sciences

**Other considerations**

It is recommended that humanities/social sciences electives include studies in:

- history of technology
- societal impacts of technology
- history
- foreign languages
- ethics
- communications
- political science

Aesthetics
Economics
Architecture

The technical-writing requirement of the Common Curriculum is satisfied by M&AE 427.

Introduction to Circuits for Electrical and Computer Engineers (EE 210) may be replaced or supplemented by Electronic Circuits (PHYS 360) or Mechatronics (M&AE 378).

A limited set of third-year courses is offered each summer under the auspices of the Engineering Cooperative Program.

**Preparation in Aerospace Engineering**

There is no separate undergraduate program in aerospace engineering, but students may prepare for a career in this area by majoring in mechanical engineering and taking courses from the aerospace engineering concentration. Students may prepare for the graduate program in aerospace engineering by majoring in mechanical engineering, in other appropriate engineering specialties such as electrical engineering or engineering physics, or in the physical sciences. Other subjects recommended as preparation for graduate study include thermodynamics, fluid mechanics, applied mathematics, chemistry, and physics.

**OPERATIONS RESEARCH AND ENGINEERING**

Offered by the School of Operations Research and Industrial Engineering

Contact: 202 Rhodes Hall, 255–5088, www.orie.cornell.edu

This major is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

This major provides a broad education in the techniques and modeling concepts needed to analyze and design complex systems and to provide an introduction to the technical and professional areas with which operations researchers and industrial engineers are concerned. The major prepares students for a wide range of careers including operations research, industrial engineering, entrepreneurship, automation technology, operations management, consulting, financial engineering, financial services, and management.

The foundation of the major is the development of basic skills in calculus, statistics, probability, mathematical programming, and computer science. Required courses in manufacturing systems, cost accounting, and simulation build on these skills and provide engineering design experiences. The design curriculum is quite flexible. Students take OR&IE electives to broaden and deepen their expertise in applied probability and statistics, industrial systems, optimization, information technology, or financial engineering.

Because of the wide range of career goals among our students, the major is designed with a minimum of required courses and a large number of required electives. Students should consult with their major advisers to select electives that best meet their future goals.

Exceptional students interested in pursuing graduate studies are encouraged to speak with their faculty advisers concerning an accelerated program of study.

A student who intends to affiliate with the major in Operations Research and Engineering should take Basic Engineering Probability and Statistics (ENGRD 270) after completing MATH 192. Early consultation with a faculty member or the associate director for undergraduate studies can be helpful in making appropriate choices.

The required courses for the ORE major and the typical terms in which they are taken are as follows:

**Term 2, 3, or 4**

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>ENGRD 211, Computers and Programming</td>
</tr>
<tr>
<td>3</td>
<td>ENGRD 270, Basic Engineering Probability and Statistics</td>
</tr>
<tr>
<td>4</td>
<td>OR&amp;IE 320, Optimization I</td>
</tr>
<tr>
<td>4</td>
<td>OR&amp;IE 350, Financial and Managerial Accounting</td>
</tr>
<tr>
<td>4</td>
<td>OR&amp;IE 360, Engineering Probability and Statistics II</td>
</tr>
<tr>
<td>3</td>
<td>Humanities/social sciences elective</td>
</tr>
</tbody>
</table>

**Term 5**

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>OR&amp;IE 310, Industrial Systems Analysis (may be taken in term 4)</td>
</tr>
<tr>
<td>4</td>
<td>OR&amp;IE 321, Optimization II</td>
</tr>
<tr>
<td>4</td>
<td>OR&amp;IE 361, Introductory Engineering Stochastic Processes I</td>
</tr>
<tr>
<td>3</td>
<td>Behavioral science (organizational behavior)?</td>
</tr>
<tr>
<td>3</td>
<td>Humanities/social sciences elective</td>
</tr>
</tbody>
</table>

The behavioral science requirement can be satisfied by any of several courses, including the Johnson Graduate School of Management (JGSM) course NCC 554 (offered only in the fall), which is recommended for those contemplating the pursuit of a graduate business degree, ILROB 170, 171, and 320, H ADM 115, and others.

The basic senior-year program, from which individualized programs are developed, consists of the following courses:

**Minimum credits**

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>OR&amp;IE 580, Simulation Modeling and Analysis</td>
</tr>
<tr>
<td>4</td>
<td>Either OR&amp;IE 416 or OR&amp;IE 480 (program design requirement)</td>
</tr>
<tr>
<td>4</td>
<td>Two upperclass OR&amp;IE electives as described below</td>
</tr>
<tr>
<td>5</td>
<td>Three major-approved electives (at least 5 credits must be outside OR&amp;IE)</td>
</tr>
<tr>
<td>6</td>
<td>Two humanities/social sciences electives</td>
</tr>
<tr>
<td>6</td>
<td>Two adviser-approved electives</td>
</tr>
</tbody>
</table>

Available OR&IE electives are as follows:

Manufacturing and distribution systems: OR&IE 416, 451, 480, 481, 483, 518, 524, 525, and 562 and JGSM MBA 641
Academic Standing
The student in the major should obtain a passing grade in every course; at least C- in ENGRD 211 and 270, OR&IE 310, 320, 321, 350, 360, 361 and 561, a semester GPA ≥ 2.0, and a passing grade in every course; at least C- in ENGRD 211 and 270, OR&IE 310, 320, 321, 350, 360, 361 and 561; a semester GPA ≥ 2.0 each semester; a GPA ≥ 2.0 for OR&IE major students. The College of Engineering offers minors and options in the following areas (offering programs are found below, in the Academic Standards section). An engineering minor or option requires:

- At most one course from any one of the groups 1, 2, 3, or 4.
- At most one course that is offered by the OR&IE or ENGRG 470, Undergraduate Engineering Teaching.
- At most one 200-level course.
- At most three courses from groups 5 and 6.
- At most one 200-level course.
- At most one course that is offered by the student's major department.

Operations Research and Engineering Honors Program
The B.S. degree with honors is granted to engineering students who satisfy the requirements given at the beginning of the section “Undergraduate 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 OR&IE at the 500 level or above.

2. A significant research experience or honors project under the direct supervision of an OR&IE faculty member using OR&IE 499, OR&IE Project. A significant written report must be submitted as part of this component.

3. A significant teaching experience under the direct supervision of a faculty member in OR&IE using OR&IE 490, Teaching in OR&IE, or ENGRG 470, Undergraduate Engineering Teaching.

4. At most one of the following two:
   - A&EP 322 Mathematical Physics II
   - ECE 411 Random Signals

5. At most one of the following two:
   - ECE 411 Random Signals
   - OR&IE 361 Introductory Engineering Stochastic Processes I

MINOR: APPLIED MATHEMATICS
Offered by the Department of Theoretical and Applied Mechanics

Contact: Richard Rand, 207 Kimball Hall, 255-7145, rhr@cornell.edu, www.tam.cornell.edu/Undergrad.html

All engineering 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 294, to be chosen as follows:

- At most one course from any one of the groups 1, 2, 3, or 4.

Groups:
1. MATH 420 differential Equations and Dynamical Systems
2. COM S 280 Discrete Structures
3. MATH 319 Introduction to Ordinary Differential Equations
4. MATH 341 Introduction to Analysis I
5. MATH 422 Applied Complex Analysis
6. MATH 423 Applied Functional Analysis
7. MATH 424 Partial Differential Equations
8. MATH 425 Basic Probability

Courses:
- MATH 319 Introduction to Ordinary Differential Equations
- MATH 420 Differential Equations and Dynamical Systems
- MATH 425 Basic Probability
- MATH 471 Basic Probability
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 may participate in only the Bioengineering Option, the Biological Engineering minor, or the Biomedical Engineering minor.

Students should meet with the BE program director as soon as they decide to pursue the minor. They will receive a BEE faculty adviser, who will assist them in completing their 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.

Requirements

At least six courses (≥ 18 credits), as follows:

BEE 350, Biological and Environmental Transport Processes

I. Analysis: Two (2) of these:
   MS&E 304 (3) Kinetics, Diffusion, and Phase Transformations
   CHEM 313 (5) Chemical Engineering Thermodynamics
   CHEM 390 (4) Reaction Kinetics and Reactor Design
   CEE 437 (3) Experimental Methods in Fluid Dynamics

II. Application: Two (2) of these:
   BEE 459 (4) Biological Engineering Analysis
   BEE 685 (4) Biological Engineering Analysis

III. Basic Sciences: One (1) of these:
   BIOC 233 (3) Introduction to Biomolecular Structure
   BIOM 290 (3) General Microbiology
   BIOM 350-353 (2–4) Principles of Biochemistry
   BIOM 454 (3) Applications of Molecular Biology
   BIONH 470 (5) Biophysical Methods

OPTION: BIOENGINEERING

Offered by the Bioengineering Program

Contact: 270 Olin Hall, 255–7577

Students in all majors, except Biological Engineering, may participate. Students may participate in only one of the Bioengineering Option, the Biological Engineering minor, or the Biomedical Engineering minor.

The purpose of the option is to provide students with a guided, coherent, individualized plan of exploration in bioengineering. Bioengineering consists of subjects that fall at the interface between engineering and life science. It involves bioprocesses, bioenvironmental engineering, biomedical devices, biomaterials, biomolecular engineering, systems biology, and more.

Students are asked to enroll after affiliation with the major adviser, who will help select appropriate bioengineering-related courses and provide advice on careers in bioengineering.

Academic standards: S in the Bioengineering Seminar and at least C- in the other courses.

Requirements

At least 12 credit hours consisting of two to three bioengineering courses, one to two biological sciences courses, and 1 credit of Bioengineering Seminar (BMEP 501). A list of approved courses can be found in 167 Olin Hall.

MINOR: BIOMEDICAL ENGINEERING

Offered by the Department of Biomedical Engineering (BME)

Contact: 270 Olin Hall, 255-1003, www.bme.cornell.edu/

BME is responsible for a new minor program in biomedical engineering. Students graduating in the Class of 2006 and later must complete the minor as specified by BME. Students graduating in 2005 may elect to complete the requirements in the Biomedical Engineering Minor offered by Theoretical and Applied Mechanics (T&AM).

All engineering majors are eligible to participate in this minor. Students may participate in only one of the Bioengineering option, the Biological Engineering minor and 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 field includes the design of biocompatible materials, prostheses, surgical implants, artificial organs, controlled drug-delivery systems, and wound closure devices. Diagnosing diseases and determining their biological origins depend upon increasingly sophisticated instrumentation and the use of mathematical models. This minor allows students in the College of Engineering 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 recognition for their interest and capability in area.

Interested students are asked to register with the Biomedical Engineering Office (270 Olin). A BME faculty adviser will be assigned and will approve the student’s BME minor plan.

Academic standards: At least C- in each course in the minor. GPA ≥ 2.0 for all courses in the minor.

Requirements

Required course: BMEP 501, Bioengineering Seminar (1 credit)

At least six courses (≥ 18 credits) from the five groups listed below, with at least four of the groups represented and four of which must be from categories 3, 4, and 5 (two courses should be in categories 1 and/or 2 with no more than one course from category 1). At least four of the six courses must be from outside the student’s major department.

1. Introductory biology (≥ 4 credits and one course toward the BMEP minor)
   BIO G 110 and ENGRG 101 Biological Principles and Introduction to Biomedical Engineering Analysis
   BIO G 101, 102, 103, 104 Biological Sciences
   BIO G 105 and 106 Introductory Biology
220 ENGINEERING - 2004-2005

MINOR: BIOMEDICAL ENGINEERING
Offered by the Department of Theoretical and Applied Mechanics

Contact: James Jenkins, 221 Kimball Hall, 255-7185, jj2@cornell.edu, www.tam.cornell.edu/Undergrad.html

All engineering undergraduates are eligible to participate in this minor unless they also are pursuing the Bioengineering Option. (Students may participate in either the Bioengineering Option or the Biomedical Engineering minor, but not both.)

Educational Objectives: Biomedical engineering is the application of engineering principles and methods to a wide array of problems associated with human health. The field includes the design of biocompatible materials, prostheses, surgical implants, artificial organs, controlled drug-delivery systems, and wound closure devices. Diagnosing diseases and determining their biological origins depend upon increasingly sophisticated instrumentation and the use of mathematical models. The purpose of this minor is to allow students in the College of Engineering 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 recognition for their interest and capability in this rapidly growing area.

Academic Standards: At least C- in each course in the minor.

Requirements
All students must take ENGRG 501, Bioengineering Seminar (1 credit). In addition, students must take at least six (6) courses (with a minimum total of 18 credits) from the five groups listed, with at least one course from each group. Four of the six courses must be outside the student's major.

1. Biomatertials and Biomechanics
   - BEE 365 (3) Properties of Biological Materials
   - MS&E 265 (3) or TXA 439 (2) Biological Materials and Their Synthetic Replacements
   - M&E 463 (3) Neuromuscular Biomechanics
   - M&E 464 (3) Orthopaedic Tissue Mechanics
   - M&E 565 (3) Biomechanical Systems—Analysis and Design

<table>
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<tr>
<th>MINOR: CIVIL INFRASTRUCTURE</th>
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<tbody>
<tr>
<td>Offered by the School of Civil and Environmental Engineering</td>
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<tr>
<td>Contact: 221 Hollister Hall, 255-3412, <a href="http://www.cee.cornell.edu">www.cee.cornell.edu</a></td>
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<tr>
<td>Students affiliated with all majors except Civil Engineering and Environmental Engineering are eligible to participate in this minor.</td>
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<tr>
<td>The minor in civil infrastructure is intended to introduce engineering 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,</td>
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</table>
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:

I. Required course: ENGRD 202 Mechanics of Solids

II. Additional courses: choose any 5

(“groupings are for information only”)

**Geotechnical engineering**

CEE 341 Introduction to Geotechnical Engineering and Analysis
CEE 440 Foundation Engineering
CEE 441 Retaining Structures and Slopes
CEE 444 Environmental Site and Remediation Engineering

**Structural engineering**

CEE 371 Structural Modeling and Behavior
CEE 372 Structural Mechanics and Analysis
CEE 471 Fundamentals of Structural Mechanics
CEE 472 Finite Element Analysis of Solids and Structures
CEE 473 Design of Concrete Structures
CEE 474 Design of Metal Structures
CEE 481 LRFD-Based Engineering of Wood Structures

**Other related courses**

CEE 595 Construction Planning and Operations

*Other CEE courses may be approved by petition in advance*

**MINOR: COMPUTER SCIENCE**

Offered by the Department of Computer Science

Contact: Upson 303, 255-0220, www.cs.cornell.edu

Students affiliated with all majors except Computer Science and Information Science, Systems, and Technology are eligible to participate in this minor. This minor is for students who anticipate that computer science will play a prominent role in their academic and professional career.

**Academic standards:** At least C in each course in the minor.

**Requirements**

At least six courses (≥ 18 credits) chosen as follows:

I. Required courses

COM S/ENGRD 211 Computers and Programming

One of the following:

COM S 321 Numerical Methods in Computational Biology
COM S/ENGRD 322 Introduction to Scientific Computing
COM S 421 Numerical Analysis

II. Additional courses

Three COM S courses numbered 280 or higher (excluding seminars and COM S 490).

Computing courses offered by other departments cannot be applied toward the Computer Science minor, with the exception of ECE 314. All qualifying courses should 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.

**Academic standards:** At least C- in each course in the minor. GPA ≥ 3.0 for all courses in the minor.

**Requirements**

At least six courses (≥ 18 credits), chosen as follows:

I. Two of the following:

ECE/ENGRD 210 Introduction to Circuits for Electrical and Computer Engineers (4 credits)
ECE 220 Signals and Information
ENGRD 230 Introduction to Digital Logic Design

II. Two of the following:

ECE 303 Electromagnetic Fields and Waves
ECE/CS 314 Computer Organization
ECE 315 Introduction to Microelectronics
ECE 320 Networks and Systems

III. One other ECE course at the 300 level or above (3-credit minimum)

IV. One other ECE course at the 400 level or above (3-credit minimum)

**MINOR: ENGINEERING MANAGEMENT**

Offered by the School of Civil and Environmental Engineering

Contact: 221 Hollister Hall, 255-3412, www.cee.cornell.edu

Students affiliated with all majors except Civil Engineering and Environmental Engineering are eligible to participate in this minor.

This minor focuses on giving engineering 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:

I. Required courses (3):

CEE 323 Engineering Economics and Management
OR&IE 350 Financial and Managerial Accounting
CEE 304 Uncertainty Analysis in Engineering
or ENGRD 270 Basic Engineering Probability and Statistics
or ECE 310 Introduction to Probability and Random Signals

II. Additional courses—choose any three*

CCE 490 Management Practice in Project Engineering
CCE 492 Engineers for a Sustainable World: Engineering in International Development
CCE 466 Civil Infrastructure Systems
CCE 593 Engineering Management Methods: Data, Information, and Modeling
CCE 594 Economic Methods for Engineering and Management
CCE 595 Construction Planning and Operations
CCE 596 Management Issues in Forensic Engineering
CCE 597 Risk Analysis and Management
CCE 598 Introduction to Decision Analysis
NBA 507 Entrepreneurship for Scientists and Engineers
or M&AE/ENGRG 461/OR&IE 452 Entrepreneurship for Engineers
or ECE 489 Engineering Entrepreneurship, Management and Ethics

*Other courses approved by petition in advance.

T&MAM 310 may not be substituted for CEE 304.
MINOR: ENGINEERING STATISTICS
Offered by the School of Operations Research and Industrial Engineering
Contact: 202 Rhodes Hall, 255–5088, www.orie.cornell.edu

Students affiliated with all majors except Operations Research and Engineering are eligible to participate in this minor.

The goal of the minor is to provide the student with a firm understanding of statistical principles and engineering applications and the ability to apply this knowledge in real-world situations.

Academic standards: At least C- in each course in the minor. GPA ≥ 2.0 for all courses in the minor.

Requirements
At least six courses (≥ 18 credits), chosen as follows:
I. Required courses:
   - ENGRD 270 Basic Engineering Probability and Statistics
   - OR&IE 360 or ECE 310 Basic Engineering Probability and Statistics II or Introduction to Probability and Random Signals
II. Four of these (≥ 11 credits):
   - OR&IE 361 or ECE 411 Introductory Engineering Stochastic Processes I or Random Signals in Communications/Signal Processing
   - OR&IE 476 Applied Linear Statistical Models
   - OR&IE 576 Regression
   - OR&IE 563 Applied Time Series Analysis
   - OR&IE 575 Experimental Design
   - OR&IE 577 Quality Control
   - OR&IE 580 Simulation Modeling and Analysis
   - MATH 472 or BTRY 409 Basic Probability or Theory of Statistics
   - BTRY 602 Statistical Methods II
   - BTRY 603 or ILRST 411 Statistical Methods III or Statistical Analysis of Qualitative Data
   - ILRST 310 Statistical Sampling
   - ILRST 314 Graphical Methods for Data Analysis
   - ILRST 410 Techniques of Multivariate Analysis

*Other course options approved by petition in advance. Some of these courses require others as prerequisites. All these courses are cross-listed under the Department of Statistical Science.

MINOR: ENVIRONMENTAL ENGINEERING
Offered jointly by the Department of Biological and Environmental Engineering and the School of Civil and Environmental Engineering

Students affiliated with all majors except Biological Engineering, Civil Engineering, and Environmental Engineering are eligible to participate in this minor.

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 251 Engineering for a Sustainable Society
   - CEE 351 Environmental Quality Engineering
   - CEE 451 Microbiology for Environmental Engineering
   - CEE 452 Water Supply Engineering
   - CEE 453 Laboratory Research in Environmental Engineering
   - CEE 454 Sustainable Small-Scale Water Supplies
   - BEE 476 Solid Waste Engineering
   - BEE 478 Ecological Engineering
   - CEE 444 Environmental Site and Remediation Engineering
   - BEE 651 Bioremediation
   - CEE 653 Water Chemistry for Environmental Engineering
   - CEE 655 Physical/Chemical Process
   - CEE 657 Biological Processes
   - CEE 658 Microbial Biodegradation and Biocatalysis Lab

Group B. Environmental systems
   - ENGR 115/CEE 112* Solving Environmental Problems for Urban Regions (*may count only if taken before the junior year)
   - BEE 475 Environmental Systems Analysis
   - CEE 597 Risk Analysis and Management
   - CEE 623 Environmental Quality Systems Engineering
   - BEE 678 Nonpoint Source Models

Group C. Hydraulics, hydrology, and environmental fluid mechanics
   - CEE 331 Fluid Mechanics (CHME 323 or M&AE 323 may be substituted for CEE 331)
   - CEE 332 Hydraulic Engineering
   - BEE 371 Hydrology and the Environment
   - CEE 451 CEE 471 Introduction to Groundwater Hydrology
   - CEE 452 Hydrology
   - CEE 456 Case Studies in Environmental Fluid Mechanics
   - CEE 457 Experimental Methods in Fluid Dynamics
   - BEE 473 Watershed Engineering
   - BEE 474 Drainage and Irrigation Systems
   - CEE 631 Computational Simulation of Transport in the Environment
   - CEE 653 Flow in Porous Media and Groundwater
   - CEE 655 Transport, Mixing, and Transformation in the Environment
   - BEE 671 Analysis of the Flow of Water and Chemicals in Soils
   - BEE 672 Drainage

MINOR: GEOLOGICAL SCIENCES
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 Geological Sciences 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:
I. At least one of these courses:
   - ENGRD 201 Introduction to the Physics and Chemistry of the Earth
   - EAS 210 Introduction to Field Methods in Geological Sciences
II. At least two of these courses:
   - EAS 302 Evolution of the Earth System
   - EAS 321 Introduction to Biogeochemistry
   - EAS 326 Structural Geology
   - EAS 355 Mineralogy
   - EAS 356 Petrology and Geochemistry
   - EAS 375 Sedimentology and Stratigraphy
   - EAS 388 Geophysics and Geotectonics
III. Additional EAS courses at the 300 level or higher. These may include, e.g.,
additional courses from the above lists, undergraduate research courses, and
outdoor field courses.

MINOR: INDUSTRIAL SYSTEMS AND
INFORMATION TECHNOLOGY
Offered by the School of Operations and
Industrial Engineering
Contact: 202 Rhodes Hall, 255-5088,
www.orie.cornell.edu
Students affiliated with any major except
Operations Research and Engineering are
eligible to participate in this minor.

The aim of this minor is to provide an in-
depth education in the issues involved in
the design and analysis of industrial systems,
and the tools from information technology
that have become an integral part of the
manufacturing process. Students will become
familiar with the problems, perspectives, and
methods of modern industrial engineering and
be prepared to work with industrial engineers
in designing and managing manufacturing
and service operations. That is, rather than
providing a comprehensive view of the range
of methodological foundations of operations
research, this minor is designed to give the
student a focused education in the application
area most closely associated with these
techniques.

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:
I. At least three of the following:
  ENGRD 270 Basic Engineering Probability
and Statistics
  OR&IE 310 Industrial Systems Analysis
  OR&IE 320 Optimization I
  OR&IE 480 Information Technology
II. The remaining courses chosen from:
  OR&IE 350 Financial and Managerial
  Accounting
  OR&IE 416 Design of Manufacturing
  Systems
  OR&IE 451 Economic Analysis of
  Engineering Systems
  OR&IE 525 Production Planning and
  Scheduling Theory and Practice
  OR&IE 577 Quality Control
  OR&IE 580 Simulation Modeling and
  Analysis

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
in the minor.

Statistics
An introductory course that provides a
working knowledge of basic probability and
statistics and their application to analyzing
real-world data.

ENGRD 270 Basic Engineering Probability
and Statistics
CE 304 Uncertainty Analysis in
Engineering
ECE 310 Introduction to Probability and
Random Signals

Information Systems
COM S 211 Computers and Programming*
INFO 230 Intermediate Design and
Programming for the Web*
INFO 330 Applied Database Systems
LING 424 Computational Linguistics
INFO 430 Information Retrieval
INFO 431 Web Information Systems
COM S 432 Introduction to Database
Systems
COM S 465 Computer Graphics I
COM S 472 Foundations of Artificial
Intelligence
LING 474 Introduction to Natural
Language Processing
OR&IE 474 Statistical Data Mining
COM S 478 Machine Learning
OR&IE 480 Information Technology
COM S 501 Software Engineering
ECE 562 Fundamental Information Theory

MINOR: INFORMATION SCIENCE
Offered by the Department of Computer
Science
Contact: Undergraduate Programs Office,
Upson 303, 255-9837, www.infosci.cornell.edu
Students affiliated with any major except
Information Science, Systems, and Technology
are eligible to participate in this minor.

COM S 578 Empirical Methods in Machine
Learning and Data Mining

*Computer Science majors cannot use INFO
230. COM S 211 cannot be used by majors for
which it is a required course, e.g., Computer
Science and Operations Research Engineering.

Human-centered Systems
COGST 101 Introduction to Cognitive
Science
PSYCH 205 Perception
INFO 214 Cognitive Psychology
INFO 245 Psychology of Social Computing
PSYCH 280 Introduction to Social
Psychology
PSYCH 342 Human Perception:
Applications to Computer Graphics, Art,
and Visual Display
INFO 345 Human-Computer Interaction
Design
PSYCH 347 Psychology of Visual
Communications
PSYCH 380 Social Cognition
PSYCH 413 Information Processing:
Conscious and Unconscious
PSYCH 416 Modeling Perception and
Cognition
INFO 440 Advanced Human-Centered
Systems
INFO 450 Language and Technology
DEA 470 Applied Ergonomics Methods

Social Systems
S&S 250 Technology in Society
INFO 292 Inventing an Information
Society
ECON 301 Microeconomics*
SOC 304 Social Networks and Social
Processes
ECON 313 Intermediate Microeconomic
Theory*
AEM 322 Technology, Information, and
Business Strategy
INFO 349 Media Technologies
INFO 355 Computers: From Babbage to
Gates
ECON 358 Game Theory*
INFO 387 The Automatic Lifestyle:
Consumer Culture and Technology
LAW 410 Limits on and Protection of
Creative Expression—Copyright Law and
Its Close Neighbors
S&S 411 Knowledge, Technology, and
Property
ECON 419 Economic Decisions Under
Uncertainty
COMM 428 Communication Law
OR&IE 435 Introduction to Game Theory*
STS 438 Minds, Machines, and Intelligence
INFO 447 Social and Economic Data
ECON 476/477 Decision Theory I and II
CIS 515 Culture, Law, and Politics of the
Internet

*Only one of ECON 301 and ECON 315. Only
one of OR&IE 435 and ECON 368.
MINOR: MATERIALS SCIENCE AND ENGINEERING
Offered by the Department of Materials Science and Engineering
Contact: 214 Bard Hall, 255-4135, www.mse.cornell.edu
Students affiliated with all majors except Materials Science and Engineering are eligible to participate in this minor.
Material properties are the foundation of many engineering disciplines including mechanical, civil, chemical, and electrical engineering. This minor provides engineers in related areas 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 261 Mechanical Properties of Materials, From Nanodevices to Superstructures, or ENGRD 262, Electronic Materials for the Information Age
2. Two of:
   - MS&E 204 Materials Chemistry
   - MS&E 206 Atomic and Molecular Structure of Matter
   - MS&E 302 Mechanical Properties of Materials, Processing, and Design
   - MS&E 303 Thermodynamics of Condensed Systems
   - MS&E 304 Kinetics, Diffusion, and Phase Transformations
   - MS&E 305 Electronic, Magnetic, and Dielectric Properties of Materials
3. Three electives chosen from:
   - Any MS&E course at the 300 level or above
   - Selected courses in materials properties and processing (at the 300 level or above) from AKP, CHEM, CEE, ECE, M&E, PHYS, and CHEM, as approved by the MS&E undergraduate major coordinator.

MINOR: OPERATIONS RESEARCH AND MANAGEMENT SCIENCE
Offered by the School of Operations Research and Industrial Engineering
Contact: 202 Rhodes Hall, 255-5088, www.orie.cornell.edu
Students affiliated with all majors except Operations Research and Engineering are eligible to participate in this minor.

Operations research and management science aims to provide rational bases for decision making by seeking to understand and model complex situations and to use tools of the area, including mathematical models, and simulation. The intent of this minor is to give a broad knowledge of these fundamentals, rather than to train students in a particular application domain. This way, students can adjust their advanced courses and pursue either methodological or application-oriented areas of greatest interest and relevance to the overall educational goals of their program.

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:
   - OR&IE 320 Optimization I
   - OR&IE 321 Optimization II
   - OR&IE 360 Engineering Probability and Statistics I
   - OR&IE 361 Introduction Engineering Stochastic Processes I
   - OR&IE 580 Simulation Modeling and Analysis
   - Any OR&IE courses at the 300 level or higher (including those in 1).

M.S. ENGINEERING DEGREES
Office of Research, Graduate Studies, and Professional Education (ORGSPE), 222 Carpenter Hall, www.engineering.cornell.edu/grad
The following one-year (30-credit) professional master of engineering (M.Eng.) degrees are offered (giving also the administering unit):

M.Eng. (Aerospace): Mechanical and Aerospace Engineering
M.Eng. (Biomedical): Biomedical Engineering
M.Eng. (Biological and Biological): Biological and Environmental Engineering
M.Eng. (Chemical): Chemical and Biomolecular Engineering
M.Eng. (Civil): Civil and Environmental Engineering
M.Eng. (Computer Science): Computer Science
M.Eng. (Electrical): Electrical and Computer Engineering
M.Eng. (Engineering Physics): Applied and Engineering Physics
M.Eng. (Geological Sciences): Earth and Atmospheric Sciences
M.Eng. (Materials): Materials Science and Engineering
M.Eng. (Mechanical): Mechanical and Aerospace Engineering
M.Eng. (Nuclear): Graduate Field of Nuclear Science and Engineering
M.Eng. (OR&IE): Operations Research and Industrial Engineering
M.Eng. (Systems): Systems Engineering

These degrees are discussed in Courses of Study (below) because the curricula are integrated with the undergraduate majors. Many Cornell bachelor's degree graduates choose to attend 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.
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 programming, finishing up their B.S. degree and also doing their first semester of the M.Eng. program.

**Master of Engineering Options**

The following M.Eng. options are offered:
- Bioengineering Option
- Financial Engineering Option
- Manufacturing Option
- Engineering Management Option
- Systems Engineering Option

**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 Twelve-Month M.B.A. Program of the Johnson Graduate School of Management (JGSM). Since 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, see Engineering Advising (167 Olin Hall), the M.Eng. office (222 Carpenter), 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 three options or categories of financial support:
- Alumni Knight Scholarship Option
- Undergraduate Knight Scholarship Option
- Six-Year Knight Scholarship Option

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 ORGSPE or refer to the Knight Scholarship web site (www.engr.cornell.edu/grad/knight) for program specifics.

**MASTER OF ENGINEERING (AEROSPACE)**

Offered by the Sibley School of Mechanical and Aerospace Engineering

Contact: 107 Upson Hall, 255-2520, www.mae.cornell.edu

The M.Eng. (Aerospace) 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, acoustics and noise, turbulent flows, nonequilibrium flows, combustion, dynamics and control, and computational fluid dynamics.

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 M&AE 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 M&AE 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 those if the courses are part of a well-defined program leading to specific professional objectives. Students are expected to use technical electives to develop proficiency in math beyond the minimum required of Cornell engineering undergraduates if they have not already done so before entering the program. Courses in advanced engineering math or statistics are particularly recommended.

Check with the M&AE graduate field office (107 Upson Hall) for additional degree requirements.

**MASTER OF ENGINEERING (AGRICULTURAL AND BIOLOGICAL)**

Offered by the Department of Biological and Environmental Engineering

Contact: 207 Riley Robb Hall, 255-2173, www.bee.cornell.edu

This degree is intended primarily for students who plan to enter engineering practice. The program is planned as an extension of an undergraduate major in biological and environmental engineering but can accommodate graduates of other engineering disciplines. The required 30 credits of courses are intended to strengthen the student's fundamental knowledge of engineering and develop their design skills. Of the 30 credits, 3 to 9 are earned for an engineering design project that culminates in a written and oral report.

Students may concentrate in any of a variety of areas: biological engineering, energy, environmental engineering, environmental management, food processing engineering, international agriculture, local roads, machine systems, soil and water engineering, and structures and environment. Elective courses are chosen from among engineering subject areas relevant to the student's interests. The design project requires courses in technical communication, math, biology, and the physical sciences may also be taken as part of a coherent program. Students can qualify for the Dean's Certificate in energy, manufacturing, or bioengineering by choosing their design project and a number of electives from the designated topical areas.

**MASTER OF ENGINEERING (BIOMEDICAL)**

Offered by the Department of Biomedical Engineering

Contact: 270 Olin Hall, 255-1003, 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 twentieth 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 BME 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. in BME with a strong B.S. program, a student can obtain the knowledge and skills necessary to be an effective professional biomedical engineer.

Students will acquire an in-depth knowledge of an essential area of biomedical engineering as well as a broad perspective of the biomedical engineering discipline that complements their undergraduate education.
in engineering or science. Graduates will be equipped to design biomedical devices and develop therapeutic strategies within the bounds of health care economics, the needs of patients and physicians, the regulatory environment for medical devices and pharmaceuticals, and stringent ethical standards.

Students will acquire depth by extending undergraduate concentrations, by selecting one of three area 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 BMEP 301, 302, 401, and 402 is highly recommended. This knowledge can be demonstrated through appropriate undergraduate course work (at least C in each class) or by passing a diagnostic exam.

Students lacking the appropriate background will need to complete additional courses (beyond the normal 30 credits) to demonstrate appropriate knowledge in these two subject areas.

MASTER OF ENGINEERING
(Chemical)
Offered by the School of Chemical and Biomolecular Engineering
Contact: 120 Olin Hall, 255-6331,
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. 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. Twelve credits in CHEME courses distributed among chemical and biomolecular engineering fundamentals (CHEME 711, 731, and 751) and chemical and biomolecular engineering applications (partial list: CHEME 480, 481, 484, 520, 543, 572, 651, 640, and 661).
2. A minimum of 3 credits of an individual or group project, CHEME 565.
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 CHEME courses (such as CHEME 572 and 661) or other courses covering these topics are required.

MASTER OF ENGINEERING (CIVIL)
Offered by the School of Civil and Environmental Engineering
Contact: 219 Hollister Hall, 255-7560,
www.cee.cornell.edu

The M.Eng. (Civil) degree program is designed to prepare students for professional practice. There are two concentrations in this program: civil and environmental engineering design and engineering management. Both require a broad-based background in an appropriate engineering field. Applicants holding an ABET-accredited (or equivalent) undergraduate degree in engineering normally satisfy this requirement. Admitted applicants without adequate preparation will require course work beyond the 30-credit minimum to fulfill the engineering preparation requirement. Both concentrations also require one course in professional (design) or managerial (management) practice and a two-course project sequence. The project entails synthesis, analysis, decision making, and application of engineering judgment. Normally it is undertaken in cooperation with an outside practitioner, with some concentration areas using an intensive, full-time session between semesters.

The general degree requirements and admissions information are described above in the section “Master of Engineering Degree Programs.” 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. (Civil) program in civil and environmental engineering design areas, the requirements are:

1. Three courses, one in professional engineering practice (CEE 503) and a two-course design project (CEE 501 and 502).
2. Work in a major concentration area: four courses in either environmental engineering, environmental fluid mechanics/hydrology, geotechnical engineering, structural engineering, or environmental and water resource systems engineering.
3. Support electives, two required.

Courses taken as support electives may consist of graduate or advanced courses in fields related to the major concentration area, either inside or outside of CEE.

For the M.Eng. (Civil) program in engineering management, the requirements are:

1. Five courses: Project Management (CEE 500), Engineering Management Methods (CEE 503 plus either 594, 597, or 598), and the Management Project (CEE 591 and 592).
2. Two managerial breadth courses.
3. 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's of Engineering and Master of Business Administration degrees. See the beginning of the section “Master of Engineering Degrees.”

MASTER OF ENGINEERING
(COMPUTER SCIENCE)
Offered by the Department of Computer Science
Contact: 4126 Upson Hall, 255-8953,
www.cs.cornell.edu/grad/meng

The M.Eng. program in computer science can be started in either the fall or spring semester. This program is designed to develop expertise in system design and implementation in many areas of computer science, including computer networks, Internet architecture, fault-tolerant and secure systems, distributed and parallel computing, high-performance computer architecture, databases and data mining, multimedia systems, computer vision, computational tools for finance, computational biology (including genomics), software engineering, programming environments, and artificial intelligence.

A typical program includes several upper-division and graduate courses and a faculty-supervised project. The flexible requirements allow students to build up a program that closely matches their interests. 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 the section “Master of Engineering Degrees.”

MASTER OF ENGINEERING
(ELECTRICAL)
Offered by the School of Electrical and Computer Engineering
Contact: 223 Phillips Hall, 255-8414,
www.ece.cornell.edu/students/meng.html

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 coursework beyond that expected in a typical undergraduate program, including at least four courses in electrical and computer engineering. The required electrical and computer engineering design project may account for 3 to 8 credits of the M.Eng. program. Occasionally, students take part in very extensive projects and may petition to increase the project component to 10 credits. Students with special career goals, such as engineering management, may apply to use up to 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) 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 MECHANICS)
Offered by the Department of Theoretical and Applied Mechanics
Contact: 212 Kimball Hall, 255–5062, www.tam.cornell.edu/meng.html
This program emphasizes fundamentals in engineering science and applied mathematics. In this way the student is prepared to handle a wide variety of multidisciplinary problems. The program is designed for engineering students and students from the physical and mathematical sciences.

Twelve of the required 30 course credits involve analysis, computation, design, or laboratory experience. Of these 12 credits, at least 6 must be earned in Theoretical and Applied Mechanics (T&AM). Up to 10 credits will be awarded for an M. Eng. project. The balance of the required 30 credits can be obtained as electives from T&AM or from other degree programs in engineering, physical or mathematical sciences. Thus, students have great flexibility in choosing a course of study tailored to their interests.

Projects may be chosen from the current interests of the faculty, including: nonlinear dynamics and chaos (with applications to problems in physics, engineering and biology), solid mechanics (fracture mechanics, nonlinear elasticity, shape-memory alloys, composite materials, ultrasonics, and acoustics), fluid mechanics (granular materials, space mechanics (evolution of the solar system, planetary rings).

The Department of Theoretical and Applied Mechanics has several laboratories equipped for the fabrication and mechanical testing of composite materials and structures. Extensive computer resources are available for numerical computations, design, or other numerical- or simulation-research activities related to composites. The Materials Science Center, the Center for Theory and Simulation in Science and Engineering, and the Computer-Aided Design Instructional Facility provide additional state-of-the-art laboratories and computer resources.

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, nanoscience and technology, device physics, materials characterization, or software engineering. Wide latitude is allowed in the choice of the required design project.

One example of a specific area of study is solid-state physics and chemistry as applied to nano-structure science and technology. Core courses include: device physics and nano-characterization of materials (A&EP 661) and the microprocessing and microfabrication of materials (A&EP 662). The design project may focus on such areas as semiconductor materials, device physics and fabrication technology, and optoelectronics. Another area of study may be applied optics, where core courses can be chosen from applied physics, electrical engineering, and physics.

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 planning to enter 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 at the undergraduate level, subjects such as electricity and magnetism, or classical, quantum, and statistical mechanics should be included in the program.

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 (such as 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 are acceptable for credit toward the degree: other undergraduate courses may be required as prerequisites but are not credited toward the degree.

MASTER OF ENGINEERING
(GEOLICAL SCIENCES)
Offered by the Department of Earth and Atmospheric Sciences
Contact: 2124 Snee Hall, 255–5466, www.eas.cornell.edu
The M.Eng. (Geological Sciences) degree program is a one-year course of study that provides future professional geologists or engineers with the geological and engineering background they will need to analyze and solve engineering problems that involve geological variables and concepts. Individual programs are developed within two established options: geohydrology and environmental geophysics.

Incoming students are expected to have a strong background in mathematics, the physical sciences, and chemistry and have a strong interest and substantial background in the geological sciences. The 30-hour M.Eng. program is intended to extend and broaden this background to develop competence in four subject categories. Typical categories for the geohydrology option are porous media flow, geology, geochemistry, and numerical modeling. Typical categories for the environmental geophysics option are geophysics, geology, porous media fluid flow, and computer methods. The courses a student selects in a category will vary depending on the student’s background and courses may be required in some categories, and the categories can be adjusted to the student’s interest and needs. Alternatives to numerical modeling in the geohydrology option could be economics or biochemistry, for example. To count toward the 30-credit degree requirement, courses must be at a graduate or advanced undergraduate level.

At least 10 of the 30 hours in the program must involve engineering design. Much of this requirement is normally met through a design project, which cannot 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) 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 MS&E. One 3-credit technical elective must include advanced math (modeling), computer application, or computer modeling, beyond the MS&E undergraduate requirements.

**MASTER OF ENGINEERING (MECHANICAL)**

Offered by the Sibley School of Mechanical and Aerospace Engineering

Contact: 107 Upson Hall, 255-5250, www.mae.cornell.edu

The M.Eng. (Mechanical) 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 adviser. This program and any subsequent changes must also be approved by the chair of the M&AE 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 M&AE 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. Students are expected to use technical electives to develop proficiency in math beyond the minimum required of Cornell engineering undergraduates if they have not already done so before entering the program. Courses in advanced engineering math or statistics are particularly recommended.

Check with the M&AE graduate field office (107 Upson Hall) for additional degree requirements.

Students enrolled in the Master of Engineering (Mechanical) degree program may take courses that also satisfy the requirements of bioengineering, engineering management, or systems manufacturing programs leading to special dean's certificates in those areas.

**MASTER OF ENGINEERING (NUCLEAR)**

Offered by the Nuclear Engineering Program

Contact: 312 Rhodes Hall, 255-1453, www.gradschool.cornell.edu/academics/research/fields/nuc-sci.html

The two-term curriculum leading to the M.Eng. (Nuclear) degree is intended primarily for individuals who want a terminal professional degree, but it may also serve as preparation for doctoral study in nuclear science and engineering. The course of study covers the basic principles of nuclear reactor systems with a major emphasis on reactor safety and radiation protection and control.

The interdisciplinary nature of nuclear engineering allows students to enter from a variety of undergraduate concentrations. The recommended background is 1) an accredited baccalaureate degree in engineering, physics, or applied science; 2) physics, including atomic and nuclear physics; 3) math, including advanced calculus; and 4) thermodynamics. Students should see that they fulfill these requirements before beginning the program. In some cases, deficiencies in preparatory work may be made up by informal study during the preceding summer. General admission and degree requirements are described in the college's introductory section.

The following courses, or equivalents, are included in the 30-credit program:

<table>
<thead>
<tr>
<th>Term</th>
<th>Courses</th>
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<tbody>
<tr>
<td><strong>Fall term</strong></td>
<td>NS&amp;E 509, Nuclear Physics for Applications</td>
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<tr>
<td></td>
<td>Technical elective</td>
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<td></td>
<td>Spring term</td>
</tr>
<tr>
<td></td>
<td>NS&amp;E 545, Energy Seminar</td>
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<tr>
<td></td>
<td>Technical elective</td>
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<tr>
<td></td>
<td>Engineering design project</td>
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<tr>
<td></td>
<td>Mathematics or physics elective</td>
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<tr>
<td></td>
<td>Engineering electives should be in a subject</td>
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<tr>
<td></td>
<td>area relevant to nuclear engineering, such as energy conversion,</td>
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<td></td>
<td>radiation protection and control, feedback control systems,</td>
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<tr>
<td></td>
<td>magnetohydrodynamics, controlled thermal elastics, and</td>
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<td></td>
<td>environmental engineering.</td>
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<td>The list below gives typical</td>
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<tr>
<td></td>
<td>electives.</td>
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<tr>
<td></td>
<td>(fall, 4 credits)</td>
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<tr>
<td></td>
<td>A&amp;EP 607, Basic Plasma Physics (spring, 4 credits)</td>
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<td></td>
<td>A&amp;EP 661, Microcharacterization (fall, 3 credits)</td>
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<tr>
<td></td>
<td>ECE 457, Silicon Device Fundamentals (fall, 4 credits with lab)</td>
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<tr>
<td></td>
<td>M&amp;E 478/CHME 372, Feedback Control Systems (fall, 4 credits)</td>
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<tr>
<td></td>
<td>MS&amp;E 459, Physics of Modern Materials Analysis (spring, 3 credits)</td>
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<td></td>
<td>MS&amp;E 603, Analytical Techniques for Materials Science (spring, 4 credits)</td>
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<td></td>
<td>NS&amp;E 484/A&amp;EP 484/ECE 484/M&amp;AE 459, Introduction to Controlled Fusion:</td>
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<td></td>
<td>Principles and Technology (spring, 3 credits)</td>
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<tr>
<td></td>
<td>NS&amp;E 521, Radiation Effects in Materials (fall, 1–3 credits)</td>
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</table>

**MASTER OF ENGINEERING (OPERATIONS RESEARCH AND INDUSTRIAL ENGINEERING)**

Offered by the School of Operations Research and Industrial Engineering

Contact: 201 Rhodes Hall, 255-9128, www.orie.cornell.edu

This two-semester professional degree program stresses applications of operations research and industrial engineering. 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 engineering applications, especially in the design or improvement of systems in manufacturing, information, finance, and nonprofit organizations.

General admission and degree requirements are described in the introductory "Degree Programs" section. The M.Eng. (OR&IE) program is intended for three groups of students: graduates of the undergraduate major in OR who wish to expand their practical knowledge of the field; Cornell undergraduates in other math-based area who want to broaden their exposure to OR&IE; and qualified non-Cornellians with strong backgrounds from other programs in the United States and abroad.
Undergraduates majoring in Operations Research and Engineering may be interested in a program that can lead, in the course of six years, to B.S., M.Eng. (Operations Research and Industrial Engineering), and M.B.A. degrees. See the section "Master of Engineering Degrees."

To ensure completion of the program in two semesters, the entering student should have completed courses in probability and statistics and in computer science, as well as four semesters of mathematics, through differential equations, linear algebra, and multivariate calculus.

Program requirements include a core of OR&IE courses plus technical electives chosen from a broad array of offerings. The choice of a particular elective sequence plus a specific project course results in completion of one of several options within the program. These include the applied operations research option, the manufacturing option, the financial engineering option, the systems engineering option, the information technology concentration, and the Semester in Manufacturing. These options are offered jointly with various other Cornell departments and schools and they provide the opportunity to interact on projects and in class with specialists in other engineering fields and in business. Many students select the applied operations research option, offered only by OR&IE, which has project teams made up entirely of OR&IE M.Eng. students and which offers the broadest choice of elective courses and career alternatives, in business and elsewhere. Students interested in an option other than the applied operations research option should obtain further information from the following: manufacturing option, Center for Manufacturing Enterprise, 207 Hollister Hall, 607-255-7757; financial engineering option and information technology option, 201 Frank H. T. Rhodes Hall, 607-255-9128; semester in manufacturing option, 304 Sage Hall, 607-255-4691; systems engineering option, 201 Frank H. T. Rhodes Hall, 607-255-9129. For students lacking an undergraduate degree in engineering, the financial engineering option, which is highly specialized, may entail additional prerequisites or more than two semesters.

I. For matriculants with preparation comparable to that provided by the undergraduate major in Operations Research and Engineering:

**Fall term**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>OR&amp;IE 516, Case Studies</td>
<td>1</td>
</tr>
<tr>
<td>OR&amp;IE 893, Applied OR&amp;IE Colloquium</td>
<td>1</td>
</tr>
<tr>
<td>M.Eng. Project</td>
<td>1</td>
</tr>
<tr>
<td>Technical electives</td>
<td>12</td>
</tr>
</tbody>
</table>

**Spring term**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>OR&amp;IE 894, Applied OR&amp;IE Colloquium</td>
<td>1</td>
</tr>
<tr>
<td>M.Eng. Project</td>
<td>minimum of 4</td>
</tr>
<tr>
<td>Technical electives</td>
<td>10</td>
</tr>
</tbody>
</table>

II. For matriculants from other majors who minimally fulfill the prerequisite requirements (students who have the equivalent of OR&IE 520, 523, and 560 will take other OR&IE electives in their place):

**Fall term**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR&amp;IE 560, Engineering Probability and Statistics</td>
<td>4</td>
</tr>
<tr>
<td>OR&amp;IE 520, Optimization I</td>
<td>4</td>
</tr>
<tr>
<td>OR&amp;IE 522, Topics in Linear Optimization</td>
<td>1</td>
</tr>
<tr>
<td>OR&amp;IE 516, Case Studies</td>
<td>1</td>
</tr>
<tr>
<td>OR&amp;IE 590, Simulation Modeling and Analysis</td>
<td>4</td>
</tr>
<tr>
<td>OR&amp;IE 893, Applied OR&amp;IE Colloquium</td>
<td>1</td>
</tr>
<tr>
<td>M.Eng. Project</td>
<td>1</td>
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</tbody>
</table>

**Spring term**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>OR&amp;IE 523, Introduction to Stochastic Processes</td>
<td>4</td>
</tr>
<tr>
<td>OR&amp;IE 894, Applied OR&amp;IE Colloquium</td>
<td>1</td>
</tr>
<tr>
<td>M.Eng. Project</td>
<td>minimum of 4</td>
</tr>
<tr>
<td>Technical electives</td>
<td>5</td>
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</tbody>
</table>

For both of the above pro forma schedules, at least 12 credit hours of the specified electives must be chosen from the list of courses offered by the School of Operations Research and Industrial Engineering. For scheduling reasons, some options may require an additional summer, depending on the student's preparation.

The project requirement can be met in a variety of ways. Common elements in all project experiences include working as part of a group of three to five students on an engineering design problem, meeting with a faculty member on a regular basis, and oral and written presentation of the results obtained. Most projects address problems that actually exist in manufacturing firms, financial firms, and service organizations such as hospitals.

Additional program requirements are described in the Master of Engineering Handbook. For further details, see the contact information at the beginning of this section.

As part of their undergraduate ORE major or M.Eng. (ORIE) curriculum, students may study several subjects that are required for the Johnson Graduate School M.B.A. This early start on business-degree requirements may make it possible to get both the M.Eng. and the M.B.A. in two years, rather than the usual three. For details, see the subsection "Cooperative Program with the Johnson Graduate School of Management in the section 'Master of Engineering Degrees,' and contact the ORIE M.Eng. office, 201 Rhodes, with an academic adviser and approved by the director of graduate studies for systems.

The requirements are:

1. SYSEN 510 (Applied Systems Engineering), SYSEN 520 (System Architecture, Behavior, and Optimization), CEE 590 (Project Management), and a two-semester systems design project (SYSEN 590 or equivalent).

2. Electives from three categories of courses: Modeling and Analysis, Applications, and Systems Management. At least one course must be taken from the Modeling and Analysis category and at most one from the Systems Management category. A list of pre-approved electives is on the Systems Engineering web site.

**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 three-digit number.

Engineering Communications ENGRC
Engineering Distribution ENGRD
Engineering General Interest ENGRG
Introduction to Engineering ENGRI
Biological and Environmental Engineering BEE
Applied and Engineering Physics A&EP
Chemical and Biomolecular Engineering CHEME
Civil and Environmental Engineering CEE
Computer Science COM S
Earth and Atmospheric Sciences EAS
Electrical and Computer Engineering ECE
Information Science IS
Materials Science and Engineering MS&E
Mechanical and Aerospace Engineering M&E
Nuclear Science and Engineering NS&E
Operations Research and Industrial Engineering OR&IE
Theoretical and Applied Mechanics T&AM

**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.

ENGRIC 334 Independent Study in Engineering Communications

Variable credits (1-5). Letter grade. By arrangement 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 documents, creating user manuals, analyzing and producing technical graphics, and learning about special problems in engineering practice, and writing about technical topics for the public.

**ENGRD 335 Communications for Engineers**

Fall, spring. 3 credits. Limited to 20 students per section. Designed for juniors and seniors. Prerequisite: two freshman writing seminars and field affiliation. This seminar focuses on communications in organizations. Undergraduate students 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 communication with colleagues, superiors, subordinates, and clients. Students develop writing and management strategies that they apply in individual and team assignments. They learn how to organize technical arguments, write reports, and present technical information to an audience. They also learn how to communicate specialized information to different audiences (e.g., technical and non-technical). (Note that absences are limited to three, after which sharp penalties occur.) Fulfills the college's technical-writing requirement. May be used as a Free or Approved Elective in expressive arts.

**ENGRD 350 Engineering Communications**

Fall and spring. 3 credits. Letter grade. 20 students per section. Designed for juniors and seniors. Prerequisite: two freshman writing seminars and field affiliation. The ability to communicate well is a factor in students' success in college and in their professional lives. This course provides students with the tools needed to communicate effectively in both technical and non-technical environments. Students learn to develop and deliver oral presentations, write technical documents, and incorporate graphics into their work. The course includes a weekly laboratory portion of the course. The laboratory provides hands-on experience in creating technical documents, preparing oral presentations, and using graphics software.

**ENGRD 210 Introduction to Circuits for Electrical and Computer Engineers (also ECE 210)**

Fall, spring. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course provides an introduction to the principles of electrical and computer engineering. Students learn about basic electrical circuits, including resistors, capacitors, and inductors. They also study circuit analysis techniques, such as nodal analysis and mesh analysis, and learn about basic circuit designs, such as simple filters and oscillators. The course emphasizes the practical application of these concepts in real-world engineering problems.

**ENGRD 211 Computers and Programming (also COM S 211)**

Fall, spring. 3 credits. Corequisite: PHYS 213. This course introduces students to the fundamentals of computer programming. Students learn how to write and debug programs using a high-level programming language, such as C or Java. They also learn about basic data structures, algorithms, and algorithm analysis. The course emphasizes problem-solving skills and the ability to think logically and creatively.

**ENGRD 212 Introduction to the Physics and Chemistry of the Earth (also EAS 212)**

Fall. 3 credits. Prerequisites: PHYS 112 or PHYS 212. This course covers the formation of the solar system, accretion and evolution of the earth, the rock cycle, radioactive isotopes and the geological time scale, plate tectonics, rocks and minerals, earth dynamics, mantle plumes, the hydrologic cycle, run-off, sedimentation, groundwater flow, contaminant transport, and the weathering cycle: chemical cycles, CO₂ (weathering) controls on global temperature (CO₂ or ocean currents), oil and mineral resources.

**ENGRD 213 Thermodynamics (also MIEE 213)**

Fall, spring. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the fundamental principles of thermodynamics and their applications in engineering. Students learn about the first and second laws of thermodynamics, and how they are used to analyze heat engines and refrigeration systems. They also study the properties of thermodynamic systems and the behavior of real gases.

**ENGRD 214 Introduction to the Physics of Life (also B&AE 214)**

Fall, spring. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the physics of the human body and its interactions with the environment. Students learn about the physics of the cardiovascular system, the respiratory system, and the nervous system. They also study the physics of energy transfer and the flow of heat in the body.

**ENGRD 215 Thermodynamics for Engineers (also ECH 215)**

Fall. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course provides an introduction to the principles of thermodynamics and their applications in engineering. Students learn about the first and second laws of thermodynamics, and how they are used to analyze heat engines and refrigeration systems. They also study the properties of thermodynamic systems and the behavior of real gases.

**ENGRD 216 Introduction to the Physics of Materials (also A&AE 216)**

Fall. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the physics of materials and their applications in engineering. Students learn about the physics of solid mechanics, including stress, strain, and deformation, and how these concepts are used to design and analyze structures.

**ENGRD 217 Introduction to the Physics of Fluids (also A&AE 217)**

Fall. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the physics of fluids and their applications in engineering. Students learn about the physics of fluid mechanics, including flow, turbulence, and heat transfer, and how these concepts are used to design and analyze systems involving fluids.

**ENGRD 218 Introduction to the Physics of Energy (also A&AE 218)**

Fall. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the physics of energy and its applications in engineering. Students learn about the physics of energy transfer, including heat, work, and power, and how these concepts are used to design and analyze systems involving energy.

**ENGRD 219 Engineering Computation (also CEE 219)**

Fall. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the principles of computational methods and their applications in engineering. Students learn about the fundamentals of numerical analysis, including error analysis, approximation, and interpolation, and how these concepts are used to solve engineering problems.

**ENGRD 220 Introduction to the Design and Implementation of Digital Circuits (also ECE 220)**

Fall, spring. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the principles of digital circuit design and their applications in engineering. Students learn about the fundamentals of digital logic, including logic gates, Boolean algebra, and computer organization, and how these concepts are used to design and implement digital circuits.

**ENGRD 221 Introduction to the Physics and Chemistry of the Earth (also EAS 221)**

Fall, spring. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the fundamental principles of earth science and their applications in engineering. Students learn about the physics of plate tectonics, erosion, and sea level change, and how these concepts are used to design and analyze systems involving earth material.

**ENGRD 222 Introduction to the Physics of Materials (also A&AE 222)**

Fall, spring. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the fundamental principles of materials science and their applications in engineering. Students learn about the physics of materials, including their structure, properties, and behavior, and how these concepts are used to design and analyze systems involving materials.

**ENGRD 223 Introduction to the Physics of Fluids (also A&AE 223)**

Fall, spring. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the fundamental principles of fluid mechanics and their applications in engineering. Students learn about the physics of fluid flow, including viscosity, turbulence, and heat transfer, and how these concepts are used to design and analyze systems involving fluid.

**ENGRD 224 Introduction to the Physics of Energy (also A&AE 224)**

Fall, spring. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the fundamental principles of energy and its applications in engineering. Students learn about the physics of energy transfer, including heat, work, and power, and how these concepts are used to design and analyze systems involving energy.

**ENGRD 225 Introduction to the Physics of Life (also B&AE 225)**

Fall, spring. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the fundamental principles of biophysics and their applications in engineering. Students learn about the physics of biological systems, including cells, tissues, and organs, and how these concepts are used to design and analyze systems involving biology.

**ENGRD 226 Introduction to the Physics of Materials (also A&AE 226)**

Fall, spring. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the fundamental principles of materials science and their applications in engineering. Students learn about the physics of materials, including their structure, properties, and behavior, and how these concepts are used to design and analyze systems involving materials.

**ENGRD 227 Introduction to the Physics of Fluids (also A&AE 227)**

Fall, spring. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the fundamental principles of fluid mechanics and their applications in engineering. Students learn about the physics of fluid flow, including viscosity, turbulence, and heat transfer, and how these concepts are used to design and analyze systems involving fluid.

**ENGRD 228 Introduction to the Physics of Energy (also A&AE 228)**

Fall, spring. 3 credits. Prerequisites: PHYS 213 and MATH 294. This course introduces the fundamental principles of energy and its applications in engineering. Students learn about the physics of energy transfer, including heat, work, and power, and how these concepts are used to design and analyze systems involving energy.
a quantitative description of the physical interactions that determine the behavior of these systems is provided. Finally, techniques that are commonly used to probe these systems, with an emphasis on current research, are discussed.

ENGRD 260 Principles of Biological Engineering (also BEE 260) Fall. 3 credits. Corequisite: MATH 293. Focuses on the integration of biological systems with engineering, math, and physical principles. Students learn how to formulate equations for biological systems in class and then practice it in homework sets. Topics range from molecular principles of reaction kinetics and nuclear binding events to macroscopic applications, such as energy and mass balances of bioprocessing and engineering design of implantable sensors.

ENGRD 261 Mechanical Properties of Materials: From Nanodevices to Superstructures (also MS&E 261) Fall. 3 credits. S. P. Baker. The mechanical properties of materials (strength, stiffness, ductility, and so on) and their physical origins are examined. The relationship of the elastic, plastic, and fracture behavior to microscopic structure in metals, ceramics, polymers, and composite materials is explored. Effects of time and temperature on materials properties are discussed. The emphasis of this course is on considerations for design and optimum performance of materials and engineered objects.

ENGRD 262 Electronic Materials for the Information Age (also MS&E 262) Fall. 3 credits. Prerequisite: MATH 192; corequisite PHYS 213 or permission of instructor. G. Malliaris. The course examines the electrical and optical properties of materials. Topics covered 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/semi-conductor junctions, and the interaction of materials with light. Applications in electrophotography, solar cells, electronics, and display technologies are discussed.

ENGRD 264 Computer-Instrumentation Design (also A&EP 264) Fall, spring. 3 credits. Prerequisite: COM S 100. 1 lec, 1 lab. Not open (without instructor’s permission) to seniors. T. Cool. Covers the use of a small computer in an engineering or scientific research laboratory. 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. Both C++ programming and graphical programming with LabVIEW are used for computer interfacing to hardware. A second goal of the course is to develop effective written communication skills in the context of science and engineering. Students prepare progress reports, technical reports, and formal articles based on the experiments.

ENGRD 270 Basic Engineering Probability and Statistics Fall, spring, summer. 3 credits. Prerequisites: MATH 191 and 192. This course gives students a working knowledge of basic probability and statistics and their application to engineering. Computer analysis of data and simulation are included. Topics include random variables, probability distributions, estimation, testing, experimental design, quality control, and regression.

ENGRD 321 Numerical Methods in Computational Molecular Biology (also BIOBM 321 and COM S 321) Fall. 3 credits. Prerequisites: at least one course in calculus such as MATH 106, 111, or 191 and a course in linear algebra such as MATH 221 or 294 or BTRY 417. Topics include error analysis, nonlinear least squares fitting, and cubic spline interpolation. More advanced problem-solving techniques that involve eigenvalue analysis, the solution of ordinary and partial differential equations, linear programming, and nonlinear minimization are also treated. The goal of the course is to develop a practical computational expertise with MATLAB and to build mathematical intuition for the problems of molecular biology. COM S majors and minors may use only one of the following toward their degree: COM S 321, 322, 421, or 428.

ENGRD 322 Introduction to Scientific Computation (also COM S 322) Spring, summer. 3 credits. Prerequisites: COM S 100 and MATH 222 or 294. An introduction to elementary numerical analysis and scientific computation. Topics include interpolation, quadrature, linear and nonlinear equation solving, least-squares fitting, and ordinary differential equations. The MATLAB computing environment is used. Vectorization, efficiency, reliability, and stability are stressed. Special lectures cover parallel computation. COM S majors and minors may use only one of the following toward their degree: COM S 321, 322, 421, or 428.

Courses of General Interest

Courses in this category are of general interest and cover technical, historical, and social issues relevant to the engineering profession. These courses may also include seminar or tutorial type courses.

ENGRG 100J Cooperative Workshop for COM S 100J Fall, spring, 1 credit. S-U grades only. Concurrent registration in COM S 100J required. Academic Excellence Workshop for COM S 100J. 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 COM S 100J.

ENGRG 210 Cooperative Workshop for COM S 211 Fall, spring, 1 credit. S-U grades only. Concurrent registration in COM S 211 required. Academic Excellence Workshop for COM S 211. 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 COM S 211.

ENGRG 321 Cooperative Workshop for CHEM 311 Fall, spring, 1 credit. S-U grades only. Concurrent registration in CHEM 311 required. Academic Excellence Workshop for CHEM 311. 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 CHEM 211.

ENGRG 250 Technology in Society (also ECE 250, HIST 250, S&T &S 250)
This course 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 293 Cooperative Workshop for MATH 293
Fall. 1 credit. S-U grades only. Concurrent registration in MATH 293 required.
Academic Excellence Workshop for MATH 293: 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 293.

ENGRG 294 Cooperative Workshop for MATH 294
Fall, spring. 1 credit. S-U grades only. Concurrent registration in MATH 294 required.
Academic Excellence Workshop for MATH 294: 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 294.

ENGRG 298 Inventing an Information Society (also AM ST 292, ECE 298, S&T &S 292, and HIST 292)
Spring. 3 credits. Approved for humanities distribution. Cannot be taken for credit after ENGRI 101. R. R. Kline.
Explores the history of information technology from the 1830s to the present by considering the technical and social history of telecommunications, the electric-power industry, television, computers, and the Internet. Emphasis is placed on the changing relationship between science and technology, the economic aspects of innovation, gender and technology, and other social relations of this technology.

ENGRG 323 Engineering Economics and Management (also CEE 323)
Spring, usually offered in summer for Engineering Co-op Program. 3 credits.
Primarily for juniors and seniors. Student must register under CEE 323. D. P. Loucks.
Introduction to engineering and business economics and to project management. Intended to give students a working knowledge of money management and how to make economic comparisons of alternative engineering designs or projects. 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 project-management problems.

ENGRG 357 Engineering in American Culture (also AM ST 356, S&T &S 357, and HIST 357)
Fall. 4 credits. Approved for humanities distribution. R. R. Kline.
The history of engineering in the United States from 1800 to the present. We investigate the education of engineers, how engineering changed from a masculine profession to one more open to women, the building of monumental projects, public images of the engineer, enthusiasm and disasters, and engineering in a global setting.

ENGRG 360 Ethical and Social Issues in Engineering (also S&T &S 360)
Spring. 3 credits. Open to sophomores. R. R. Kline.
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; whistleblowing; 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 461 Entrepreneurship for Engineers (also M &AE 461, OR &IE 452)
Fall. 3 credits. Enrollment open to upperclassmen: others with permission of instructor.
For description, see M &AE 461.

ENGRI 110 Lasers and Photonics (also A &EP 110)
Fall. 3 credits. A. Gatica.
Lasers have had an enormous impact on communications, medicine, remote sensing, and material processing. In this course we review 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 and projects. The course concludes with courses on holography, laser processing of materials, optical tweezers, and fiber optics.

ENGRI 111 Nanotechnology (also MS &E 111)
Fall. 3 credits. E. Giannelis.
Nanotechnology has been enabling the Information Revolution with the development of even faster and more powerful devices for manipulating, storing, and transmitting information. In this hands-on course, students learn how to design and manipulate materials to build devices and structures in applications ranging from computers to telecommunications to biotechnology.

ENGRI 112 Introduction to Chemical Engineering (also CHEM 112)
Fall. 3 credits. Limited to freshmen. T. M. Duncan.
Design and analysis of processes involving chemical change. Students learn strategies for design, such as creative thinking, conceptual block-busting, 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.
ENGR 113 Solving Environmental Problems for Urban Regions (also CEE 113)
Spring. 3 credits. M. L. Weber-Shirk.
Learn how to design: reservoirs to provide water during droughts, aqueducts to transport water, and water treatment plants to prevent waterborne diseases. Take field trips, build a computer-simulated water treatment plant, and explore new technologies for making safe drinking water.

ENGR 115 Engineering Applications of Operations Research
Fall, spring. 3 credits. Enrollment not open to OR&E upper-class majors.
An 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.

ENGR 116 Modern Structures (also CEE 116)
Fall. 3 credits. M. J. Sansalone.
An introduction to structural engineering in the 21st-century—the challenges structural engineers face and the innovative approaches they are using to address them. Using case studies of famous structures, students learn to identify different structural forms and understand how various forms carry load—using principles of statics, mechanics, and material behavior. In addition, the historical, economic, social, and political context for each structure is discussed. Case studies of failures are used to explain how structures fail in earthquakes and other extreme events, and students are introduced to analytical and experimental approaches (shake table and wind tunnel testing) to quantifying loads on structures subjected to extreme events. Types of structures considered include skyscrapers, bridges, aircraft, and underground structures. Includes a project to design, analyze, build, and test a structure subjected to dynamic loads.

ENGR 117 Introduction to Mechanical Engineering (also M&AE 117)
Fall. 3 credits. 2 lectures and 1 lab per week.
An introduction to fundamentals of engineering, with emphasis on mechanical and aerospace engineering. The lectures will cover a little from each aspect of mechanical and aerospace engineering applied to how to design and analyze products or devices and their performance. Students learn and understand characteristics, the behavior of materials, and material selection for performing engineering function. They also learn fundamentals of fluid mechanics, heat transfer, automotive engineering, engineering design and product development, patents and intellectual property, and engineering ethics. There will be a final project in which students use the information learned to design and manufacture a product.

ENGR 118 Design Integration: A Portable CD Player (also M&AE 118 and TAMH 118)
Spring. 3 credits. W. Sachse.
This course examines the roles of various engineering disciplines on the design of a portable compact disc (CD) player. Students are introduced to elements of mechanical, electrical, materials, environmental, manufacturing, and computer engineering as related to the CD player. Laboratory sessions and demonstrations are used to illustrate the principles of design.

ENGR 119 Biomaterials for the Skeletal System (also M&AE 119)
Fall. 3 credits. D. T. 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 covered include strength, corrosion, wear, and biocompatibility. Case studies of design lead to consideration of regulatory approval requirements and legal liability issues.

ENGR 122 Earthquake! (also EAS 122)
Spring. 3 credits. I. D. Brown.
The science of natural hazards and strategic resources is explored. This course 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 materials; and the historical importance of earthquakes. Includes seismic experiments on campus to probe for groundwater, the new critical environmental resource.

ENGR 124 Designing Materials for the Computer (also MSAE 124)
Spring. 3 credits. 5 lectures.
Introduces the materials, processes, and properties of the semiconductors, polymers, ceramics, and metals used in the microelectronics industry to form integrated circuits, electronic devices, and displays. This course examines lithographic processing, metallization, diffusion, ion implantation, oxidation, and other processes used in fabricating electronic devices and their packages. The technology of displays is discussed, including liquid crystal displays and light-emitting devices.

ENGR 126 Introduction to Signals and Telecommunications
Spring. 3 credits. D. F. Delchamps.
This course introduces the concepts that underlie wired and wireless communication systems. Students achieve a rudimentary understanding of basic ideas such as coding and data compression, frequency content, bandwidth, and filtering; sampling and reconstruction; and time- and frequency-division multiplexing. Discussions of practical applications focus on areas such as the public switched telephone network, ISDN, ATM, and TCP/IP. Students also develop an appreciation for the development of the field. The course includes both lectures and laboratory demonstrations.

ENGR 127 Introduction to Entrepreneurship
Spring. 3 credits. Open to all Cornell students regardless of major. No prerequisites.
This course provides 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-technology 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.

ENGR 165 Computing in the Arts (also CIS 165, COM S 165)
Fall. 3 credits. S-U grade optional. Complements ART 171+ and MUSIC 120+.
For description, see CIS 165.

ENGR 167 Visual Imaging in the Electronic Age (also CIS 167, COM S 167)
Spring. 3 credits. S-U grade optional.
For description, see CIS 167

ENGR 172 Computation, Information, and Intelligence (also COGST 172 and COM S 172)
Fall. 3 credits. Prerequisites: some knowledge of differentiation required. Permission of instructor required for students who have completed the equivalent of COM S 100. Not offered 2004-2005.
An introduction to computer science using methods and examples from the field of artificial intelligence. Topics include game playing, search techniques, learning theory, computer-intensive methods, data mining, information retrieval, the web, natural language processing, machine translation, and the Turing test. This is not a programming course; rather, "pencil and paper" problem sets will be assigned. Some calculus required.

ENGR 185 Art, Archaeology, and Analysis (also EAS 200, and MSAE 285)
An interdisciplinary course on the use of techniques of science and engineering in cultural research. Includes applications of physical and physiological principles to the study of archaeological artifacts and works of art. Also covers historical and technical aspects of artistic creation. Students learn analyses by modern methods to deduce geographical origins, and for exploration, dating, and authentication of cultural objects. Does not meet liberal studies distribution requirement for Engineering.

APPLIED AND ENGINEERING PHYSICS


A&EP 102 Introduction to Nanoscience and Nanotechnology (also ENGR 102)
Spring. 3 credits.
This is a course in the Introduction to Engineering series. For description, see ENGR 130.

A&EP 110 Lasers and Photonics (also ENGR 110)
Fall. 3 credits. A. Gaeta.
This is a course in the Introduction to Engineering series. For description, see ENGR 110.
A&EP 217 Electricity and Magnetism (also PHYS 217)
Fall, spring. 4 credits. Prerequisites: approval of student's advisor and permission of the instructor; co-registration in PHYS 216 or knowledge of special relativity at the level of PHYS 116; MATH 192 or equivalent and co-registration in MATH 191 or equivalent. Intended for students who have done well in PHYS 112 or 116 (or the equivalent) and in mathematics who desire a more analytic treatment than that of PHYS 213. At the level of Electricity and Magnetism by Purcell. Recommended for prospective engineering physics majors. A placement quiz may be given early in the semester, permitting those students who find the material too abstract or analytical to transfer into PHYS 213 without difficulty.

A&EP 252 The Physics of Life (also ENGRD 252)
Fall. Prerequisites: MATH 192, CHEM 207 or 211, and co-registration in or completion of PHYS 213. L. Pollack. For description, see ENGRD 252.

A&EP 264 Computer-Instrumentation Design (also ENGRD 264)
Fall, spring. 3 credits. Prerequisites: COM S 100 or 100-1. Lab. not open (without instructor's permission) to seniors. For description, see ENGRD 264.

A&EP 321 Mathematical Physics I
Fall, summer. 4 credits. Prerequisite: MATH 294. Intended for upper-level undergraduates in the physical sciences. B. Kusse.

Review of vector analysis; complex variable theory, Cauchy-Riemann conditions, complex Taylor and Laurent series, Cauchy integral formula and residue techniques, conformal mapping. Fourier Series. Fourier and Laplace transforms; ordinary differential equations; separation of variables. Texts: Mathematical Methods for Physicists, by Arfken; Mathematical Physics, by Butkov.

A&EP 322 Mathematical Physics II

Topics: partial differential equations, Bessel functions, spherical harmonics, separation of variables, wave and diffusion equations, Laplace, Helmholtz, and Poisson's Equations, transform techniques, Green's functions; integral equations, Fredholm equations, kernels; complex variables, theory, branch points and cuts, Riemann sheets, method of steepest descent; tensors, contravariant, and covariant representations; group theory, matrix representations, class and character. Texts: Mathematical Methods for Physicists, by Arfken; Mathematical Physics, by Butkov.

A&EP 324 Maple Supplement to Mathematical Physics 321 and 322
Spring. 1 credit. R. V. E. Loveless.
The course gives a broad introduction to Maple in applications to problems of mathematical physics similar to those covered in A&EP 321 and 322. We use Maple to solve differential equations—both linear and nonlinear. We make extensive use of plotting capabilities of Maple. Additionally, we cover matrices, complex functions, Laplace and Fourier transforms (and FFTs), and group theory. We also give an introduction to LaTeX.

A&EP 330 Modern Experimental Optics (see also PHYS 330)
Fall. 4 credits. Enrollment limited. Prerequisites: PHYS 214 or equivalent. E. Bodenschatz.
A practical laboratory course in basic and modern optics. The various projects cover a wide range of topics from geometrical optics to wave 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.

A&EP 333 Mechanics of Particles and Solid Bodies
Fall, summer. 4 credits. Prerequisites: PHYS 112 or 116 and coregistration in A&EP 321 or equivalent or permission of instructor. This course 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. (On the level of Classical Dynamics, by Marion and Thornton.)

A&EP 355 Intermediate Electromagnetism
Fall, summer. 4 credits. Prerequisites: PHYS 214 or 217 and coregistration in A&EP 321 or equivalent, or permission of instructor. Topics: vector calculus, electrostatics, analytic and numerical solutions to Laplace's equation in various geometries, electric and magnetic multipoles, electric and magnetic materials, energy in fields, quasistatics, and magnetic circuit design. Emphasis is on developing proficiency with analytical and numerical solution techniques in order to solve real-world design problems.

A&EP 356 Intermediate Electrodynamics
Spring. 4 credits. Prerequisite: A&EP 355 and coregistration in A&EP 322 or equivalent, or permission of instructor. Topics: electromagnetic waves, waveguides, transmission lines, dispersive media, radiation, special relativity, interference phenomena. Emphasis is on physical concepts and developing ability to design/analyze microwave circuits and antenna arrays.

A&EP 361 Introductory Quantum Mechanics
Spring. 4 credits. Prerequisites: A&EP 333 or PHYS 318; coregistration in A&EP 322 or equivalent and in A&EP 356 or PHYS 326.
A first course in the systematic theory of quantum phenomena. Topics include wave mechanics, the Dirac formalism, angular momentum, the hydrogen atom, and perturbation theory.

A&EP 363 Electronic Circuits (also PHYS 360)
Fall, spring. 4 credits. Prerequisites: PHYS 208 or 213 or permission of the instructor. No previous experience with electronics assumed; however, the course moves quickly through some introductory topics such as basic DC circuits. Fall term usually less crowded. 1 lab. Fall: E. Kirkland; spring: J. Alexander.
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.

A&EP 423 Statistical Thermodynamics
Fall. 4 credits. Prerequisite: introductory 3-semester physics sequence plus 1 year of junior-level mathematics. Quantum statistical basis for equilibrium thermodynamics, macrocanonical, 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 Thermal Physics, by Kittel and Kroemer, and Statistical Physics, by Rossiter.

A&EP 434 Continuum Physics
Spring. 4 credits. Prerequisites: A&EP 333 and 356 or equivalent.

A&EP 438 Computational Engineering Physics
Spring. 3 credits. Prerequisites: COM S 100, A&EP 321, 355, 356, or equivalent, or permission of instructor; coregistration in PHYS 361 permitted.
Numerical computation (derivatives, integrals, differential equations, matrices, boundary-value problems, relaxation, Monte Carlo methods, etc.) is introduced and applied to engineering physics problems that cannot be solved analytically (three-body problem, electrostatic fields, quantum energy levels, etc.). Computer programming required (in C or optionally C++, FORTRAN, or Pascal). Some prior exposure to programming assumed but no previous experience with C assumed.
A&EP 440 Quantum and Nonlinear Optics
An introduction to the fundamentals of the interaction of laser light with matter. Topics include the propagation of laser beams in bulk media and guided-wave structures, the origins of optical nonlinearities, harmonic generation, self-focusing, optical bistability, propagation of ultrashort pulses, solitons, optical coherence, optical resonance and two-level atoms, atom cooling and trapping, multiphoton processes, spontaneous and stimulated scattering, and ultra-intense laser-matter interactions.

A&EP 450 Introductory Solid State Physics (also PHYS 454)
Fall. 3 credits. Prerequisites: some exposure to quantum mechanics at the level of PHYS 443, A&EP 361, or CHEM 793 is highly desirable but not absolutely required.
An introduction to 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. Optical properties, magnetism, and superconductivity are covered 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.

A&EP 470 Biophysical Methods (also BIONB 470)
Spring. 3 credits. Prerequisites: solid knowledge of basic physics and mathematics through the sophomore level; some knowledge of cellular biology helpful but not required. Letter grades only.
An overview of the diversity of modern biophysical experimental techniques used in the study of biological systems at the cellular and molecular level. Topics covered include methods that examine both structure and function of biological systems, with emphasis on the physical properties and applications of these methods to biological membranes. The course format includes assigned literature reviews by the students on specific biophysics topics and individual student presentations on these topics. The course is intended for students of the engineering, physics, chemistry, and biological disciplines who seek an introduction to modern biophysical experimental methods.

A&EP 484 Introduction to Controlled Fusion: Principles and Technology (also ECE 484, M&AE 459, and NS&E 484)
Spring. 3 credits. Prerequisites: PHYS 112, 213, and 214, or equivalent background in electricity and magnetism and mechanics; and permission of instructor. Intended for seniors and graduate students. Offered on demand.
For description, see NS&E 484.

A&EP 490/491 Independent Study in Engineering Physics
Fall. spring. Credit TBA.
Laboratory and 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.

Spring. 3 credits. Prerequisites: A&EP 356, 361, 423, 450 (or equivalent).
Directed at students who have had an introductory course in solid state physics at the level of Kittel. This course concentrates on the application of the quantum mechanical theory of solid state physics to semiconductor materials, some solid state electronic devices, old state detectors and generators of electro-magnetic radiation, superconducting devices and materials, the nonlinear optical properties of solids, ferromagnetic materials, nanoscale devices, and mesoscopic quantum mechanical effects. The course stresses the basic, fundamental physics underlying the applications rather than the applications themselves. At the level of Introduction to Applied Solid State Physics by Dalven.

A&EP 607 Advanced Plasma Physics (also ECE 578)
Spring. 4 credits. Prerequisites: ECE 581 and A&EP 606. Offered on demand.
For description, see ECE 582.

A&EP 633 Nuclear Reactor Engineering (also NS&E 633)
Fall. 4 credits. Prerequisite: introductory course in nuclear engineering. Offered on demand.
A&EP 661 Nancharacterization
Fall. 3 credits. Prerequisites: Fourier transforms, basic electromagnetism, and graduate-level quantum mechanics or chemistry. Undergraduates should consult with the instructor before enrolling in this class.
A graduate-level introduction to the tools used to image and probe optical, electronic, chemical, and mechanical properties at the nanoscale and below. Discussion centers on the physical interaction processes used for characterization, quantification, and interpretation of the collected signals, common artifacts, the engineering tradeoffs 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 IMS.

A&EP 662 Micro/Nano-fabrication and Processing
Spring. 3 credits. An introduction to the fundamentals of micro- and nano-fabricating and patterning thin-film materials and surfaces, with emphasis on electronic and optical materials, micro-mechanics, and optical 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.

A&EP 663 Nanobiotechnology (also BIO G 663 and MS&E 563)
Spring. 3 credits. Letter grade only. C. Batt. Upper level undergraduate and graduate-level course that covers the basics of biology and the principles and practice of microfabrication techniques. The course focuses on applications in biomedical and biological research. A team design project that stresses interdisciplinary communication and problem solving is one of the main requirements. The course is held twice weekly with 75-minute classes. All lectures are teleconferenced to our NBTC associate institutes.

A&EP 711 Principles of Diffraction (also MS&E 671)
This course is a 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.

A&EP 751 M ENG Project
Fall. spring. 6–12 credits TBA. Required for candidates for the M.Eng. (Engineering Physics) degree. Independent study under the direction of a member of the university faculty. Students partial, or complete, classwork or an independent research project through work on a self-selected problem related to their field of interest. A formal and complete research report is required.

A&EP 753 Special Topics Seminar in Applied Physics
Fall. 1 credit. Prerequisite: undergraduate physics. Required for candidates for the M.Eng. (Engineering Physics) degree and recommended for seniors in engineering 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.

A&EP 781 Advanced Plasma Physics I: Cosmic Plasma Physics (also ECE 601)
Fall. 3 credits. R. Lovelace.
The course uses the text Cosmic Plasma Physics by Boris Somov and covers the following topics: charged particles and EM fields; statistical description of plasma; distribution functions and the Vlasov equation, propagation of particles, motion of particles in given fields, wave particle interactions.
Coulomb collisions, hydrodynamic description of plasmas, magnetohydrodynamic description of plasmas, and cosmic plasma flows.

A&EP 782 Advanced Plasma Physics (also ECE 682)  Spring. 3 credits. Prerequisite: ECE 581. C. E. Seyler
For description, see ECE 682.

BIOLICAL AND ENVIRONMENTAL ENGINEERING

For complete course descriptions, see the Biological and Environmental Engineering listing in the College of Agriculture and Life Sciences section or visit the department web site, www.bee.cornell.edu.

BEE 151 Introduction to Computing  Fall. 4 credits. Prerequisite: MATH 191 or equivalent (coregistration permissible). Each lab and recitation section limited to 22 students.

BEE 200 The BEE Experience  Spring. 1 credit.

BEE 222 Bioengineering Thermodynamics and Kinetics  Spring. 3 credits. Prerequisites: MATH 192, BIO 100, PHYS 213, and one course in chemistry.

BEE 251 Engineering for a Sustainable Society (also ENGRD 251)  Fall. 3 credits. Corequisite: MATH 293.

BEE 260 Principles of Biological Engineering (also ENGRD 260)  Fall. 3 credits. Corequisite: MATH 293.

BEE 299 Sustainable Development: A Web-Based Course  Spring. 3 credits. Prerequisite: sophomore standing and above. S-U grades optional.

BEE 301 Renewable Energy Systems  Spring. 3 credits. Prerequisite: college physics.

BEE 325 Environmental Management  Fall. 3 credits.

BEE 350 Biological and Environmental Transport Processes  Fall. 3 credits. Prerequisites: MATH 293 and fluid mechanics (coregistration permissible).

BEE 360 Molecular and Cellular Bioengineering (also BMEP 360)  Spring. 3 credits. Prerequisite: biochemistry or A&EP 252.

BEE 365 Properties of Biological Materials  Spring. 3 credits. Prerequisites: ENGRD 202 (coregistration permissible).

BEE 368 Biotechnology Applications: Animal Bioreactors  Fall. 3 credits. Prerequisite: biochemistry or permission of instructor.

BEE 371 Physical Hydrology for Ecosystems  Spring. 3 credits. Prerequisite: 1 course in calculus.

BEE 427 Water Sampling and Measurement  Fall. 3 credits. Prerequisites: soils and/or fluids or hydrology courses and MATH 191.

BEE 435 Principles of Aquaculture  Spring. 3 credits. Prerequisite: minimum junior standing.

BEE 450 Bioinstrumentation  Spring. 4 credits. Prerequisites: linear differential equations, physics or electrical science, computer programming, and use of spreadsheets.

BEE 453 Computer-Aided Engineering: Applications to Biomedical Processes (also M&E 453)  Spring. 3 credits. Prerequisite: heat and mass transfer (BEE 350 or equivalent).

BEE 454 Physiological Engineering  Fall. 3 credits. Corequisite: fluid mechanics.

BEE 456 Biomechanics of Plants (also BIO PL 456)  Fall. 3 credits. Prerequisites: upper division undergraduate or graduate status, completion of introductory sequence in biology, and 1 year of calculus, or permission of instructor. S-U grades optional.

BEE 459 Biosensors and Bioanalytical Techniques  Spring. 4 credits. Prerequisites: biochemistry or permission of instructor.

BEE 464 Bioseparation Processes  Fall. 3 credits. Prerequisites: biochemistry, physics, MATH 112 or 192, BEE 260, or permission of instructor.

BEE 471 Introduction to Groundwater (also CEE 431 and EAS 445)  Spring. 3 credits. Prerequisites: MATH 293, fluid mechanics or hydrology course. For description, see CEE 431.

BEE 473 Watershed Engineering  Fall. 3 credits. Prerequisite: fluid mechanics or hydrology.

BEE 474 Water and Landscape Engineering Applications  Spring. 3 credits. Prerequisites: fluid mechanics, hydrology, or permission of instructor.

BEE 475 Environmental Systems Analysis  Fall. 3 credits. Prerequisites: computer programming and 1 year of calculus.

BEE 476 Solid Waste Engineering  Spring. 3 credits. Prerequisites: 1 semester of physics and chemistry.

BEE 478 Ecological Engineering  Spring. 3 credits. Prerequisite: junior-level environmental quality engineering course or equivalent.

BEE 481 LRFD-Based Engineering of Wood Structures (also CEE 481)  Spring. 3 credits. Prerequisite: ENGRD 202.

BEE 484 Metabolic Engineering  Spring. 3 credits. Prerequisites: biochemistry or permission of instructor.

BEE 487 Sustainable Energy Systems  Spring. 3 credits. Prerequisites: BEE 350 and thermodynamics.

BEE 489 Engineering Entrepreneurship, Management and Ethics  Spring. 3 credits. Prerequisites: ENGRD 270 or CEE 304 or equivalent, junior standing.

BEE 493 Technical Writing for Engineers  Fall, spring. 1 credit. Corequisite: BEE 450/473.

BEE 494 Special Topics in Biological and Environmental Engineering  Fall, spring. 1-4 credits. S-U grades optional.

BEE 495 BEE Honors Research  Fall, spring. 1-6 credits. Prerequisites: enrollment in the BEE Honors Research Program.

BEE 496 Capstone Design in Biological and Environmental Engineering  Fall, spring. 1-3 credits. Corequisite: BEE 473 or BEE 478, or BEE 481 and permission of instructor. Completed independent study form (available in 140 Roberts Hall) is required to register.

BEE 497 Individual Study in Biological and Environmental Engineering  Fall, spring. 1-4 credits. Prerequisite: written permission of instructor and adequate ability and training for the work proposed. Normally reserved for seniors in upper two-fifths of their class. S-U grades optional. Completed independent study form (available in 140 Roberts Hall) is required to register.

BEE 498 Undergraduate Teaching  Fall, spring. 1-4 credits. Prerequisite: written permission of instructor. Completed independent study form (available in 140 Roberts Hall) is required to register.

BEE 499 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. Completed independent study form (available in 140 Roberts Hall) is required to register.

BEE 501 Bioengineering Seminar (also BMEP 501)  Fall, spring. 1 credit. For junior, senior, and graduate students only.

BEE 551/552 Agricultural and Biological Engineering Design Project  Fall, spring. 551, 5-6 credits. Prerequisite: admission to the M.Eng. (Agricultural and Biological) degree program.

BEE 625 Environmental Management  Fall. 3 credits. Prerequisite: graduate standing.

BEE 647 Water Transport in Plants  Fall. 2 credits. Offered alternate years.

BEE 649 Solute Transport in Plants  Fall. 2 credits. Offered alternate years.

BEE 651 Bioremediation: Engineering Organisms to Clean Up the Environment  Spring. 3 credits. Prerequisites: BIOMI 290 or BIOMI 398 or BIOMI 331 or permission of instructor.
BEE 652 Instrumentation: Sensors and Transducers
Spring. 3 credits. Prerequisites: linear differential equations, introductory chemistry and introductory physics, or permission of instructor.

BEE 655 Thermodynamics and Its Applications
Spring. 3 credits. Prerequisite: MATH 293 or equivalent.

BEE 659 Biosensors and Bioanalytical Techniques
Spring. 4 credits. Prerequisites: biochemistry and permission of instructor.

BEE 671 Analysis of the Flow of Water and Chemicals in Soils
Fall. 3 credits. Prerequisites: 4 calculus courses and fluid mechanics.

BEE 672 Drainage
Spring. 4 credits. Prerequisites: BEE 471 or BEE 473. S-U grades optional.

BEE 673 Sustainable Development Seminar (also NBA 572)
Spring. 1-3 credits. Prerequisite: upper division undergraduate and graduate students or permission of instructor.

BEE 678 Nonpoint Source Models
Spring. 3 credits. Prerequisites: computer programming and calculus.

BEE 685 Biological Engineering Analysis
Spring. 4 credits. Prerequisite: TAM 310 or permission of instructor.

BEE 687 Sustainable Bio-based Industries
Fall. 1 credit. Prerequisite: graduate standing.

BEE 694 Graduate Special Topics in Agricultural and Biological Engineering
Fall, spring. 1-6 credits. Prerequisite: permission of instructor. S-U grades optional.

BEE 697 Graduate Individual Study in Agriculture and Biological Engineering
Fall, spring. 1-6 credits. Prerequisite: permission of instructor. S-U grades optional.

BEE 700 General Seminar
Fall. 1 credit. S-U grades only.

BEE 750 Orientation to Graduate Study
Fall. 1 credit. S-U grades only. Limited to newly joining graduate students.

BEE 754 Watershed Management
Spring. 2-3 credits. Prerequisite: graduate standing or permission of instructor.

BEE 760 Nucleic Acid Engineering (also BMPE 760)
Fall. 3 credits. Prerequisite: BEE 360 or permission of instructor.

BEE 771 Soil and Water Engineering Seminar
Fall. spring. 1-3 credits. Prerequisite: graduate status or permission of instructor. S-U grades optional.

BEE 781 Structures and Related Topics Seminar
Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only.

BEE 785 Biological Engineering Seminar
Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only.

BEE 787 Industrial Ecology of Agriculturally Based Bioindustries
Spring. 3 credits. Prerequisites: 1 year calculus, MATLAB, BEE 687, graduate standing.

BEE 788 Biomass Conversion of Energy and Chemicals
Fall. 3 credits. Prerequisites: one year of college calculus and a minimum of one course in thermodynamics and computer programming.

BEE 800 Master's-Level Thesis Research
Fall, spring. 1-15 credits. Prerequisite: permission of adviser. S-U grades only.

BEE 900 Doctoral-Level Thesis Research
Fall, spring. 1-15 credits. Prerequisite: permission of adviser. S-U grades only.

BIOMEDICAL ENGINEERING

Michael L. Shuler, chair; Donald L. Bartel, associate director; William Lee Olbricht, director of graduate studies; Larry Bonassar, David Putnam

BMPE 101 Introduction to Biomedical Engineering Analysis (also ENGR 101)

BMPE 301 Molecular Principles of Biomedical Engineering (also CHEM 401)
Fall. 3 credits. Prerequisites: BMEP 301 or prior course work in BIO G 110, BIO BM 330, BME PM 290 or equivalent. Lec and lab. S. Archer and staff.

Introduction to genomics, proteomics, bioinformatics, and computational biology with an emphasis on the engineering challenges for these areas. 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.

BMPE 302 Cellular Principles of Biomedical Engineering (also CHEM 402)
Spring. 3 credits. Prerequisite: BMPE 301 or prior course work in BIO G 110, BIOBM 330, BOMI 290 or equivalent plus mathematics through differential equations (e.g., MATH 221 or 294), or permission of instructor. Lecture and laboratory. D. A. Putnam, S. Archer.

Integration of mammalian cell biology with engineering modeling principles, put into the context of medical pathology and disease states. Three modules comprising: 1) cell culture techniques/receptor ligand interactions, 2) cellular trafficking, and 3) signal transduction.

BMPE 330 Introduction to Computational Neuroscience (also BIONB 330, PSYCH 330, and COGST 330)
Fall. 3 credits. Limited to 25 students. For description, see BIONB 330.

BMPE 360 Molecular and Cellular Bioengineering (also BEE 360)
Spring. 3 credits. Prerequisite: biochemistry or A&EP 252.

BMPE 375 Biomedical Engineering Analysis of Metabolic and Structural Systems (also M&AEE 468)
Fall. 3 credits. Prerequisite: prior course work in basic biology. Prior course work in solid mechanics and fluid mechanics is highly recommended. Lecture and laboratory.

This course presents the quantitative biology of the renal, respiratory, cardiovascular, and musculoskeletal systems. Mathematical modeling of physiological processes involving mechanics and transport in solid and fluid organs is included.

BMPE 401 Information Exchange in Biomedical Engineering Systems
Spring. 3 credits. Prerequisite: BMPE 401 or permission of instructor. Lecture and laboratory.

Quantitative biology of the endocrine, nervous, and immune systems. Computation and mathematics of neural nets, communication among macroscale biocommunication systems.

BMPE 404 CDE in Biomedical System Design (also ECE 402)
Spring. 1-4 credits. Co- or prerequisites: at least one of ECE 425, ECE 470, ECE 453, J. C. Hudina.

For description, see ECE 402.

BMPE 440 Electronics in Neurobiology (also BIONB 440)
Fall. 4 credits. Limited to seniors, and graduate students. Prerequisite: a calculus course. S-U grades optional. Offered alternate years. B. R. Land.

For description, see BIONB 440.

BMPE 441 Computer in Neurobiology (also BIONB 441)
Fall. 4 credits. Limited to seniors, and graduate students. Prerequisite: a calculus course. S-U grades optional. Offered alternate years. B. R. Land.

For description, see BIONB 441.

BMPE 463 Neuromuscular Biomechanics (also M&AEE 463)
Spring. 3 credits. Prerequisites: ENGRD 202 and 203, or permission of instructor. Offered alternate years.

For description, see M&AEE 463.

BMPE 464 Orthopaedic Tissue Mechanics (also M&AEE 464)
Spring. 3 credits. Prerequisites: ENGRD 202 and M&AEE 325 or permission of instructor. Offered alternate years.

For description, see M&AEE 464.

BMPE 481 Biomedical Engineering (also CHEM 481)
Spring. 3 credits. Prerequisite: CHEME 324 or equivalent or permission of instructor. Lecture and laboratory.

W. L. Olbricht.

For description, see CHEME 481.

BMPE 491 Principles of Neurophysiology (also BIONB 491)
Spring. 4 credits. Limited to 20 students. Prerequisite: BIONB 222 or written permission of instructor. S-U grades optional for graduate students with permission of instructor. B. R. Johnson.

For description, see BIONB 491.
For description, see A&EP 470.

For description, see M&AE 565.

and pharmaceuticals, and stringent ethical needs of patients and physicians, the

Applications in human medicine. Co­

Students learn how to design biomedical
devices or therapeutic

occasionally be held outside of scheduled
times.

BMEP 539 Biomedical Materials and Devices for Human Body Repair (also TXA 439)

Spring. 2-3 credits. Prerequisites: college Natural Science requirement (Chem. or Biol). C. C. Chu.

For description, see TXA 439. Extra project required; same lectures as TXA 439.

BMEP 550 Product Engineering and Design in Biomedical Engineering

Spring. 3 credits. Prerequisite: graduate standing with priority given to M.Eng.

Students majoring in BMEP. D. L. Bartel.

Students learn how 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 of biomedical engineering practice.

BMEP 565 Biomechanical Systems—Analysis and Design (also M&AE 565)

Fall. 3 or 4 credits. Prerequisites: undergraduate courses in dynamics and strength of materials (e.g., TRAM/ENGRD 202 and 203) and senior standing, graduate standing or permission of instructor.

For description, see M&AE 565.

BMEP 570 Biophysical Methods (also BIONB 470 and A&EP 470)

Spring. 3 credits. Prerequisites: solid knowledge of basic physics and mathematics through the sophomore level, some knowledge of cellular biology helpful but not required. Letter grades only.

For description, see A&EP 470.

BMEP 578 Computer Analysis of Biomed Images (also ECE 578)

Spring. 4 credits. Prerequisite: permission of instructor. A. P. Reeves.

For description, see ECE 578.

BMEP 591 Design Project

Fall, spring. 3-0 credits. Students are encouraged to register for two terms as a continuing course. Required for M. Eng.

students majoring in BME.

Design and economic evaluation of a biomedical engineering device or therapeutic strategy. Team projects are encouraged.

BMEP 607 Principles of Magnetic Resonance Imaging (MRI)

Fall. 3 credits. Prerequisite: graduate standing or permission of instructor. Y. Wang.

Physical principles and engineering techniques of MRI. Application in human medicine. Co­taught with Well Medical College.

BMEP 631 Engineering Principles for Drug Delivery (also CHEME 631)

Fall. 3 credits. Prerequisites: graduate standing and background in organic and polymer chemistry or permission of instructor.

Application of engineering design principles to problems in drug formulation and delivery. Specific topics include traditional drug formulation, mechanisms and kinetics of pharmacological stability, stimuli-sensitive systems, controlled release devices, prodrugs, targeted drug delivery, biomaterials, gene therapy, and governmental regulatory issues.

BMEP 663 Advanced Topics in Neuromuscular Biomechanics (also M&AE 663)

Spring. 3 credits. Permission of instructor only. Offered at alternate years. F. Valero-Cuevas.

For description, see M&AE 663.

[BMEP 664 Mechanics of Bone (also M&AE 664)]

Spring. 3 credits. Prerequisites: graduate standing or permission of instructor.


BMEP 665 Principles of Tissue Engineering (also M&AE 665 and MS&E 665)

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. J. Bonassar.

This course covers introductory concepts in tissue engineering, including polymeric biomaterials used for scaffolds, mechanisms of cell-biomaterial interaction, biocompatibility and foreign body response, cell engineering, and tissue biomechanics. This knowledge is applied to engineering of several body systems, including the musculoskeletal system, cardiovascular tissues, the nervous system, and artificial organs. These topics are discussed in the context of scale-up, manufacturing, and regulatory issues.

BMEP 703 Graduate Student Teaching Experience

Fall. Spring. Variable credit. S-U grades optional. Staff.

Guided individual experience in laboratory instruction and/or lectures/recitation instruction. Provides a preparatory teaching experience for graduate students considering an academic career.

BMEP 711 Fundamentals of Biomedical Engineering Research I

Fall. 3 credits. Prerequisite: graduate standing. Priority is given to MS/PhD graduate students with a major or minor in BME. 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.

BMEP 712 Fundamentals of Biomedical Engineering Research II

Spring. 3 credits. Prerequisite: BMEP 711 or permission of instructor. Staff.

Continuation of BMEP 711.

BMEP 716 Immersion Experience in Medical Research and Clinical Practice

Summer. 6 credits. Prerequisite: open to PhD students in BME. D. L. Bartel.

A six-week immersion at Weill Medical College. Students participate in lectures, rounds, and seminars; observe surgeries; and solve medical problems presented by the staff.

BMEP 731 Advanced Biomedical Engineering Analysis of Biological Systems

Fall. 3 credits. Prerequisite: graduate standing. Priority given to MS/PhD and M.Eng. students majoring in BMEP. Not offered 2004–2005. Staff.

The fundamentals of quantitative analysis of biological systems. The course illustrates analytical methods applicable to a variety of biological systems, ranging from molecular to cellular to organ to application of whole-body systems.

BMEP 760 Nucleic Acid Engineering (also BEE 760)

Spring. 3 credits. Prerequisite: BEE 360 or permission of instructor.

For description, see BEE 760.

BMEP 790 Biomedical Engineering Seminar

Fall, spring. 1 credit. Prerequisite: graduate standing. Staff.

Research-based seminars. May meet concurrently with other seminar series as appropriate.

BMEP 890 MS Thesis Research

Fall, spring. Variable credit.

Thesis research for the M.S. degree in BME.

BMEP 990 Ph.D. Thesis Research

Fall, spring. Variable Credit.

Thesis research for the Ph.D degree in BME.

CHEMICAL AND BIOMOLECULAR ENGINEERING


CHEME 112 Introduction to Chemical Engineering (also ENGR 112)

Fall. 3 credits. Limited to freshmen. T. M. Duncan.

This is a course in the Introduction to Engineering series. For description, see ENGR 112.

CHEME 219 Mass and Energy Balances (also ENGR 219)

Fall. 3 credits. Corequisite: physical or organic chemistry or permission of instructor. W. L. Olbricht.

For description, see ENGR 219.

CHEME 301 Nonresident Lectures

Spring. 1 credit. P. Clancy.

Lectures from industry and from selected departments of the university provide information to assist students in their post­graduate plans.

CHEME 313 Chemical Engineering Thermodynamics

Fall. 3 credits. Prerequisite: physical chemistry II. F. A. Escobedo.
A study of the first and second laws and their consequences for chemical systems. Thermodynamic properties of pure fluids, solids, and mixtures, phase and chemical reaction equilibria; heat effects in batch and flow processes, and power cycles and refrigeration.

**CHEM 323 Fluid Mechanics**
Spring. 3 credits. Prerequisites: CHEM 219 and engineering mathematics sequence. D. Koch.

**CHEM 324 Heat and Mass Transfer**
Fall. 3 credits. Prerequisite: CHEM 323. C. Cohen.

**CHEM 332 Analysis of Separation Processes**
Spring. 3 credits. Prerequisites: CHEM 313 and 324. Y. L. Joo.
This course covers 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.

**CHEM 372 Introduction to Process Dynamics and Control**
Spring. 2 credits. Prerequisites: CHEM 313 and 323. A. B. Anton.
Modeling and analysis of the dynamics of chemical processes, Laplace transforms, block diagrams, feedback control systems, and stability analysis.

**CHEM 390 Reaction Kinetics and Reactor Design**
Spring. 3 credits. Prerequisites: CHEM 313 and 323. J. R. Engstrom.
A study of chemical reaction kinetics and principles of reactor design for chemical processes.

**CHEM 391 Physical Chemistry II (also CHEM 391)**
Spring. 4 credits. Limited to engineering students. T. M. Duncan.
For description, see CHEM 391.

**CHEM 401 Molecular Principles of Biomedical Engineering (also BMEP 301)**
Fall. 3 credits. Prerequisites: BIO G 110 or BIO BM 330. K. H. Lee.
For description, see BMEP 301.

**CHEM 402 Cellular Principles of Biomedical Engineering (also BMEP 302)**
Spring. 3 credits. D. Putnam.
For description, see BMEP 302.

**CHEM 432 Chemical Engineering Laboratory**
Fall. 4 credits. Prerequisites: CHEM 323, 324, 332, and 390. 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.

**CHEM 462 Chemical Process Design**
Spring. 4 credits. Prerequisite: CHEM 432. 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.

**CHEM 470 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.

**CHEM 472 Feedback Control Systems (also ECE 472 and M&AE 478)**
Fall. 4 credits. Prerequisites: CHEM 372, ECE 301, M&AE 326, or permission of instructor. A. B. Anton and R. D'Andrea.
For description, see M&AE 478.

**CHEM 480 Chemical Processing of Electronic Materials**
Spring. 3 credits. A. B. Anton.
Introduction to chemical processing of semiconductor materials for the manufacture of microelectronic devices, with specific emphasis on thermodynamics, transport phenomena, and kinetics. Topics include semiconductor properties and behavior, microelectronic device operation, thermochemistry of deposition and etching reactions, vacuum transport, plasmas, PVD, oxidation, diffusion, CVD, and statistical process control.

**CHEM 481 Biomedical Engineering (also BMEP 481)**
Spring. 3 credits. Prerequisite: CHEM 324 or equivalent or permission of instructor. W. L. Olbricht.
Special topics in biomedical engineering, including cell separations, blood flow, design of artificial devices, biomaterials, image analysis, biological transport phenomena, pharmacokinetics and drug delivery, biomedical transducers (EKG and pace makers), and analysis of physiological processes such as adhesion, mobility, secretion, and growth.

**CHEM 484 Microchemical and Microfluidic Systems**
Fall. 3 credits. Prerequisite: CHEM 390 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.

**CHEM 490 Undergraduate Projects in Chemical Engineering**
Fall, spring. 1-6 credits (1 credit per section).
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.

**CHEM 491 Undergraduate Teaching in Chemical Engineering**
Fall. 1 credit. T. M. Duncan and M. Ackley.
Methods of instruction in chemical engineering acquired through discussions with faculty and by assisting with the instruction of freshmen and sophomores.

**CHEM 520 Chemical, Polymer, Biomedical, and Electronic Materials Processing**
Fall, spring. 1-6 credits (1 credit per section).
An introduction to polymer processing and analysis and mathematical modeling, graphical methods and dynamic scaling. Open to nonchemical engineers only.

**CHEM 520.1 An Overview of Chemical Processing**
Spring. 1 credit. Meets first third of term. Limited to nonchemical engineers. T. M. Duncan.
An introduction to chemical engineering design and analysis—mathematical modeling, graphical methods and dynamic scaling. Open to nonchemical engineers only.

**CHEM 520.2 Introduction to Biomedical Engineering**
Spring. 1 credit. Meets first third of term. W. L. Olbricht.
Meets concurrently with CHEM 481.

**CHEM 520.3 Introduction to Electronic Materials Processing**
Spring. 1 credit. Meets first third of term. A. B. Anton.
Meets concurrently with CHEM 480.

**CHEM 520.4 Introduction to Polymer Processing**
Spring. 1 credit. Meets second third of term. L. A. Archer.
Overview and simple quantitative analyses of several plastic processes with an emphasis on the role of rheology in polymer processing.

**CHEM 520.5 Chemical Engineering Tools and Equipment**
Spring. 1 credit. Meets first third of term. A. M. Center.
An introduction to 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 troubleshooting methods frequently used by chemical engineers.

**CHEM 520.6 Introduction to Petroleum Refining**
Fall. 1 credit. Meets second third of term. A. M. Center.
The petroleum refining industry including crude oil evaluation, fuel quality, refining processes, refinery configurations, and refinery economics.

**CHEM 543 Bioprocess Engineering**
Fall. 3 credits. Prerequisite: CHEM 390 or permission of instructor. No prior background in the biological sciences required. M. L. Shuler.
A discussion of principles involved in using microorganisms, tissue cultures, and enzymes for processing. Primary emphasis is on production of biopharmaceuticals, but biological waste treatment and medical systems are also considered.

**CHEM 565 Design Project**
Fall, spring. 3 or 6 credits. Required for students in the M.Eng. (Chemical) program.
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.
**CHEM 572 Managing New Business Development**  
Fall. 3 credits. Prerequisites: graduate standing; undergraduates must have permission of instructor. A. M. Center. A case study approach introduces 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.

**CHEM 590 Special Projects in Chemical Engineering**  
Fall, spring. Variable credit. Limited to graduate students. Nonthesis research or studies on special problems in chemical engineering.

**CHEM 631 Engineering Principles for Drug Delivery (also BMEP 631)**  
Fall. 3 credits. Prerequisite: graduate standing or permission of instructor. For description, see BMEP 631.

**CHEM 640 Polymeric Materials**  

**CHEM 644 Aerosols and Colloids**  
Fall. 3 credits. D. 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, rheological, and phase behaviors; and their role in technologies including paints, foods, health-care products, drug delivery, composite materials, and air pollution control.

**CHEM 661 Air Pollution Control**  

**CHEM 675 Synthetic Polymer Chemistry (also MS&E 622 and CHEM 671)**  
Fall. 4 credits. Prerequisites: CHEM 590-360 or equivalent or permission of instructor. For description, see CHEM 671.

**CHEM 711 Advanced Chemical Engineering Thermodynamics**  
Fall. 3 credits. Prerequisite: CHEM 313 or equivalent. P. H. Stein. Postulatory approach to thermodynamics. Legendre transformations. Equilibrium and stability of general thermodynamic systems. Applications of thermodynamic methods to advanced problem solving. Introduction to statistical mechanical ensembles, phase transitions, Monte Carlo methods, and theory of liquids.

**CHEM 713 Chemical Kinetics and Transport**  
Spring. 3 credits. P. H. Stein. 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.

**CHEM 731 Advanced Fluid Mechanics and Heat Transfer**  
Fall. 3 credits. Prerequisites: CHEM 324 and 342 or equivalent. Y. L. Joo. Topics include: derivation of conservation equations; convective 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.

**CHEM 741 Selected Topics in Biochemical Engineering**  
Fall. 3 credits. Corequisite: CHEM 711 or equivalent. Offered alternate years; next offered 2005-2006. C. Cohen. Discussion of current topics and research in biochemical engineering for graduate students.

**CHEM 745 Physical Polymer Science I**  
Fall. 3 credits. Corequisite: CHEM 711 or equivalent. Covers thermodynamic properties of dilute, semifluid, and concentrated solutions from both classical and scaling approaches. Also covers characterization techniques of dilute solutions: osmometry, light scattering, viscometry, and sedimentation. Covers rubber elasticity, mechanical and thermodynamic properties of gels. Includes discussion of polymer melts: equations of state and glass transition phenomenon.

**CHEM 751 Mathematical Methods of Chemical Engineering Analysis**  
Fall. 4 credits. D. L. Koch. 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.

**CHEM 753 Analysis of Nonlinear Systems: Stability, Bifurcation, and Continuation**  
Fall. 3 credits. Prerequisite: CHEM 751 or equivalent. Offered alternate years. P. H. Stein. Topics include elements of stability and bifurcation theory, branch-following techniques, stability of discrete and continuous systems; and application to elasticity and reaction-diffusion, and hydrodynamic systems using software for continuation problems.

**CHEM 790 Seminar**  
Fall. Spring. 1 credit each term. General chemical engineering seminar required of all graduate students in the field of chemical and biomolecular engineering.

**CHEM 890 Thesis Research**  
Fall, spring. Variable credit. Thesis research for the M.S. degree in chemical engineering.

**CHEM 990 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. Within each mission area are 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 113 Solving Environmental Problems for Urban Regions (also ENGR 113) (S.3cr.)

CEE 116 Modern Structures (also ENGR 116) (F.3cr.)

CEE 241 Engineering Computation (also ENGRD 241) (S.3cr.)

CEE 401 Undergraduate Engineering Teaching (S,4cr.)

CEE 408 Introduction to CAD (F,4cr.)

CEE 509 Special Topics in Civil and Environmental Engineering (F,5cr.)

CEE 532 Engineering Economics and Management (also ENGRG 325) (S,5cr.)

CEE 600 Senior Honors Thesis (F,5cr.)

CEE 901 Undergraduate Engineering Teaching in CEE (F,5cr.)

**Civil Infrastructure**

See also: CEE 116, CEE 241, CEE 304, CEE 508, CEE 503, and CEE 595

**Geotechnical Engineering**

CEE 241 Introduction to Geotechnical Engineering and Analysis (S,5cr.)

CEE 448 Foundation Engineering (F,5cr.)

CEE 449 Retaining Structures and Slopes (S,5cr.)

CEE 450 Environmental Site and Remediation (S,5cr.)

CEE 501/502 Project Design in Geotech/Structures (F,5cr.)

CEE 602 Seminar—Civil Infrastructure (F,5cr.)

CEE 640 Foundation Engineering (F,3cr.)

CEE 641 Retaining Structures and Slopes (S,5cr.)
CEE 644 Environmental Applications of Geotechnical Engineering (S,3cr.)
CEE 649 Special Topics in Geotechnical Engineering (F,S,Var.)
CEE 740 Engineering Behavior of Soils (F,3cr.)
CEE 741 Rock Engineering (F,3cr.)
CEE 744 Advanced Foundation Engineering (S,2cr.)
CEE 745 Soil Dynamics (S,3cr.)
CEE 746 Embankment Dam Engineering (S,2cr.)
CEE 749 Research in Geotechnical Engineering (F,S,Var.)
CEE 840 Thesis—Geotechnical Engineering (F,S,Var.)

Structural Engineering
CEE 116 Modern Structures (F,3cr.)
CEE 371 Structural Modeling and Behavior (S,4cr.)
CEE 372 Structural Mechanics and Analysis (F,3cr.)
CEE 471 Fundamentals of Structural Mechanics (F,3cr.)
CEE 472 Finite Element Analysis of Solids and Structures (S,3cr.)
CEE 473 Design of Concrete Structures (F,4cr.)
CEE 474 Design of Metal Structures (F,3cr.)
CEE 475 Introduction to Composite Materials (S,3cr.)
CEE 476 Evaluation and Failure of Structures (S,3cr.)
CEE 477 Concrete Materials and Construction (S,3cr.)
CEE 478 Structural Dynamics and Earthquake Engineering (S,3cr.)
CEE 479 Collaborative Distance Design of Structural Systems (F,S,8cr.)
CEE 481 LRFD-Based Engineering of Wood Structures (S,3cr.)
CEE 501/502 Design Project in Structural Engineering (F,5cr.)
CEE 602 Seminar—Civil Infrastructure (F,S,1cr.)
CEE 671 Structural Mechanics (F,3cr.)
CEE 672 Finite Element Analysis of Solids and Structures (S,3cr.)
CEE 673 Design of Concrete Structures (F,4cr.)
CEE 675 Concrete Materials and Construction (S,3cr.)
CEE 676 Finite Element Analysis for Mechanical, Structural, and Aerospace Applications (S,3cr.)
CEE 677 Engineering Analysis (F,3cr.)
CEE 678 Structural Dynamics and Earthquake Engineering (S,3cr.)
CEE 679 Evaluation and Failure of Structures (S,3cr.)
CEE 697 Special Topics in Structural Engineering (F,S,Var.)
CEE 770 Engineering Fracture Mechanics (F,3cr.)
CEE 771 Stochastic Mechanics (F,3cr.)
CEE 772 Random Vibration (F,3cr.)
CEE 773 Structural Reliability (F,3cr.)
CEE 774 Advanced Structural Concrete (F,3cr.)
CEE 775 Mathematical and Computational Modeling of Material Behavior (S,3cr.)
CEE 776 Advanced Topics in Stability (F,3cr.)
CEE 777 Computational Solids and Structural Mechanics (S,4cr.)
CEE 778 National Disaster Risk Assessment and Management (S,3cr.)
CEE 783 Civil and Environmental Engineering Materials Project (F,S,Var.)
CEE 785 Research in Structural Engineering (F,S,Var.)
CEE 880 Thesis—Structural Engineering (F,S,Var.)

Environment
See also CEE 113, CEE 241, and CEE 304

Environmental Engineering
CEE 113 Solving Environmental Problems for Urban Regions (S,3cr.)
CEE 351 Environmental Quality Engineering (S,3cr.)
CEE 451 Microbiology for Environmental Engineering (F,3cr.)
CEE 452 Water Supply Engineering (S,3cr.)
CEE 453 Laboratory Research in Environmental Engineering (F,3cr.)
CEE 454 Sustainable Small-Scale Water Supplies (F,3cr.)
CEE 501/502 Design Project in Environmental Engineering (F,3cr.)
CEE 601 Seminar—Water Resources and Environmental Engineering (F,1cr.)
CEE 653 Water Chemistry for Environmental Engineering (F,3cr.)
CEE 654 Aquatic Chemistry (S,3cr.)
CEE 655 Transport, Mixing, and Transformation in the Environment (F,3cr.)
CEE 656 Physical/Chemical Process (F,3cr.)
CEE 657 Biological Processes (S,3cr.)
CEE 658 Microbial Biodegradation and Biocatalysis Lab (S,3cr.)
CEE 659 Seminar—Environmental Quality Engineering (S,1cr.)
CEE 750 Research in Environmental Engineering (F,S,Var.)
CEE 759 Special Topics in Environmental Engineering (F,S,Var.)
CEE 850 Thesis—Environmental Engineering (F,S,Var.)

Environmental Systems
See Engineering Systems and Management mission areas for a listing of courses in Environmental and Public Systems.

Environmental Fluid Mechanics and Hydrology
CEE 331 Fluid Mechanics (F,S,4cr.)
CEE 332 Hydraulic Engineering (S,3cr.)
CEE 431 Introduction to Groundwater Hydrology (also GEOL 445 and BEE 471) (S,3cr.)
CEE 432 Hydrology (S,3cr.)
CEE 435 Coastal Engineering (S,3cr.)
CEE 436 Case Studies in Environmental Fluid Mechanics (S,4cr.)
CEE 437 Experimental Methods in Fluid Dynamics (S,3cr.)
CEE 501/502 Design Project in Environmental Systems (F,S,3cr.)
CEE 503 Seminar—Water Resources and Environmental Engineering (F,1cr.)
CEE 531 Computational Simulation of Transport in the Environment (S,3cr.)
CEE 632 Hydrology (S,3cr.)
CEE 633 Flow in Porous Media and Groundwater (F,3cr.)
CEE 634 Boundary Layer Meteorology (F,3cr.)
CEE 635 Small and Finite Amplitude Water Waves (S,3cr.)
CEE 636 Environmental Fluid Mechanics (S,3cr.)
CEE 637 Experimental Methods in Fluid Dynamics (S,4cr.)
CEE 638 Seminar—Hydraulics (S,1cr.)
CEE 639 Special Topics in Hydraulics (F,S,Var.)
CEE 655 Transport, Mixing, and Transformation in the Environment (F,3cr.)
CEE 735 Research in Hydraulics (F,S,Var.)
CEE 850 Thesis—Fluid Mechanics and Hydrology (F,S,Var.)

Engineering Systems and Management
See also CEE 113, CEE 241, and CEE 304

Engineering Management
CEE 490 Management Practice in Project Engineering (F,3cr.)
CEE 590 Project Management (F,S,4cr.)
CEE 591 Engineering Management Project (F,3cr.)
CEE 592 Engineering Management Project (S,3cr.)
CEE 593 Engineering Management Methods: Data, Information, and Modeling (F,3cr.)
CEE 594 Economic Methods for Engineering and Management (S,4cr.)
CEE 595 Construction Planning and Operations (F,3cr.)
CEE 596 Management Issues in Forensic Engineering (F,3cr.)
CEE 597 Risk Analysis and Management (S,3cr.)
CEE 598 Introduction to Decision Analysis (F,3cr.)
CEE 599 Special Topics in Engineering Management (F,S,Var.)
CEE 694 Research in Engineering Management (F,S,Var.)

Environmental and Public Systems
CEE 323 Engineering Economics and Management (also ENGRG 323) (S,3cr.)
CEE 501/502 Design Project in Environmental Systems (F,S,3cr.)
CEE 597 Risk Analysis and Management (S,3cr.)
CEE 620 Water Resource Systems Engineering (S,3cr.)
CEE 621 Stochastic Hydrology (S,3cr.)
CEE 623 Environmental Quality Systems Engineering (F,S,3cr.)
CEE 628 Seminar—Environmental and Water Resources Systems Analysis (S,1cr.)
CEE 722 Environmental and Water Resources Systems Analysis Research (F,S,3cr.)
CEE 729 Special Topics in Environmental and Water Resources Systems Analysis (F,S,var.)
CEE 820 Thesis—Environmental and Water Resources Systems Engineering (F,S,3cr.)

**Remote Sensing**

CEE 411 Remote Sensing: Resource Inventory Methods (also CSS 411) (S,3cr.)
CEE 610 Remote Sensing Fundamentals (F,S,3cr.)
CEE 615 Digital Image Processing (S,3cr.)
CEE 617 Special Topics—Remote Sensing (F,S,3cr.)
CEE 710 Research—Remote Sensing (F,3cr.)
CEE 810 Thesis—Remote Sensing (F,S,3cr.)

**Systems Engineering**

CEE 406 Civil Infrastructure Systems (S,3cr.)
CEE 504 Applied Systems Engineering (also MREE 591, ECE 512, ORIF 512, SYSEN 510, COM S 504, ORIF 504) (F,3cr.)
CEE 505 Applied Systems Engineering (also MREE 592, ECE 513, ORIF 513, SYSEN 520, COM S 505) (S,3cr.)
CEE 509 Heuristic Methods of Optimization (also COM S 574, CIS 572, ORIF 533) (F,S,4cr.)
CEE 603 Seminar—Engineering Systems and Management (F,3cr.)

**Transportation**

CEE 361 Introduction to Transportation Engineering (S,Su,3cr.)
CEE 463 Transportation and Information Technology (F,3cr.)
CEE 464 Transportation Systems Design (S,3cr.)
CEE 661 Urban Transportation Planning and Modeling (F,3cr.)
CEE 662 Urban Transportation Network and Design (F,S,3cr.)
CEE 663 Network Flows and Algorithms (S,3cr.)
CEE 762 Practicum in Modeling Transportation Systems (F,3cr.)
CEE 764 Special Topics in Transportation (F,S,3cr.)
CEE 860 Thesis—Transportation Engineering (F,S,3cr.)

**CEE 113 Solving Environmental Problems for Urban Regions (also ENGRD 113)**

Spring. 3 credits. Students must register under ENGRD 113. M. L. Weber-Shirk.
This is a course in the Introduction to Engineering series. For description, see ENGRD 113.

**CEE 116 Modern Structures (also ENGRD 116)**

Fall. 3 credits. Students must register under ENGRD 116. M. J. Sansalone.
This is a course in the Introduction to Engineering series. For description, see ENGRD 116.

**CEE 241 Engineering Computation (also ENGRD 241)**

Spring. 3 credits. Prerequisites: COM S 100 and MATH 293. Corequisite: MATH 294 (completion of MATH 294 is suggested). Students must register under ENGRD 241. C. A. Shoemaker.
For description, see ENGRD 241.

**CEE 304 Uncertainty Analysis in Engineering**

Fall. 4 credits. CEE Engineering Co-op students may substitute summer ENGRD 270. Prerequisite: first-year calculus. J. R. Stedinger.
Introduction to probability theory and statistical techniques, with examples from civil, environmental, biological, and related disciplines. Course covers data presentation, commonly used probability distributions describing natural phenomena and material properties, parameter estimation, confidence intervals, hypothesis testing, simple linear regression, and nonparametric statistics. Examples include structural reliability, windspeed/flood distributions, pollutant concentrations, and models of vehicle arrivals.

**CEE 308 Introduction to CADD**

Fall, spring. 1 credit. Prerequisite: affiliation in CEE or permission of instructor. Course begins second full week of classes. J. F. Abel.
Learn to employ Computer Aided Design and Drafting (CADD) to construct 2D drawings and 3D models using a variety of AutoCAD 2004 techniques. Alternative software tools for 3D visualization and solid modeling are introduced. Course meets in ACCEL once per week for twelve weeks, and grades are based on attendance, weekly exercises completed in class, and a semester project.

**CEE 309 Special Topics in Civil and Environmental Engineering**

Fall, spring. 1-6 credits. Staff.
Supervised study by individuals or groups of upper-division students on an undergraduate research project or on specialized topics not covered in regular courses.

**CEE 323 Engineering Economics and Management (also ENGRD 323)**

Spring; usually offered in summer for Engineering Co-op Program. 3 credits. A. H. Meyburg and J. F. Abel.
Introduction to technological, economic, and social aspects of transportation. Emphasis is on 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 371 Structural Modeling and Behavior**

Spring. 4 credits. Prerequisite: ENGRD 202. J. F. Abel.
An introduction to the structural engineering enterprise including aspects of design, loads, behavior, form, modeling, mechanics, materials, analysis, and construction.

**CEE 372 Structural Mechanics and Analysis**

Fall. 4 credits. Prerequisite: ENGRD 202. J. F. Abel.
A strong foundation of mechanics and analysis is created by focusing on linear elastic behavior; the application of finite-element software. Covers: hydrostatics, the basic equations of incompressible fluid flow, potential flow and dynamic pressure forces, viscous flow and shear forces, steady pipe flow, turbulence, dimensional analysis, laminar and turbulent boundary layer, flows around obstacles, and open-channel flow. Includes small-group laboratory assignments.

**CEE 373 Hydraulic Engineering**

Application of fluid-mechanical principles to problems of engineering practice and design: hydraulic machinery, open-channels, and river engineering. Lectures supplemented by laboratory work and a design project.
Topics include surface and internal wave dynamics, sediment and nutrient contaminant transport, and interfacial transfer. Lectures are based on laboratory/field projects. Course includes a design project.

[CEE 437 Experimental Methods in Fluid Dynamics]
Spring. 3 credits. Prerequisites: CEE 331 or equivalent and CEE 504 or equivalent (both may be taken concurrently). Next offered 2005-2006. E. A. Cowen. Same as CEE 637 but no project is required. For description, see CEE 637.

CEE 440 Foundation Engineering
Fall. 3 credits. Prerequisite: CEE 341. F. H. Kuhlawy. This course 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 441 Retaining Structures and Slopes
Spring. 3 credits. Prerequisite: CEE 341. T. D. O'Rourke. This course covers Earth pressure theories; design of rigid, flexible, braced, tied-back, slurry, 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 444 Environmental Site and Remediation Engineering
Spring. 3 credits. Prerequisite: CEE 341. T. D. O'Rourke. This course covers the principles of hydrogeology, contaminant migration, and remediation technologies related to geotechnical and environmental engineering. Emphasis is on environmental site assessment, site feasibility studies, selection of remediation procedures, and engineered landfill designs. Design problems are based on real projects and involve visits from practicing engineers.

CEE 451 Microbiology for Environmental Engineering
Fall. 3 credits. Prerequisites: two semesters of college chemistry; organic chemistry or permission of instructor. R. F. Richardson. This course is intended to provide a background for moving to further study and commercial software and obtaining a strong professional background for entering environmental engineering and science. The course provides an overview of the characteristics of bacteria, archaea, unicellular eukaryotes (protozoa, algae, fungi), and viruses. Discussions of cell structure, bioenergetics and metabolism, and microbial genetics are included. 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; molecular microbiology; and microbial ecology. This is an introductory course and is inappropriate for those who have taken BIOM 290 or equivalent.

CEE 452 Water Supply Engineering

CEE 453 Laboratory Research in Environmental Science
Fall. 3 credits. Prerequisites: CEE 351 or permission of instructor. M. L. Weber-Shirk. Laboratory investigations of reactor flow characteristics; acid rain/lake chemistry; contaminated soil-site assessment and remediation; and wastewater treatment. Design of laboratory experiments, data analysis, computerized process control, and model development are emphasized.

CEE 454 Sustainable Small-Scale Water Supplies
Fall. 3 credits. Offered alternate years. 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 463 Transportation and Information Technology
Spring. 3 credits. Prerequisite: CEE 361. M. A. Turnquist. Advanced techniques for physical and operational design of transportation systems, including analytical modeling techniques underlying design criteria. Evaluation of alternative designs. Management and operating policies, including investment strategies. Facility location decisions, networks, and passenger and freight terminals.

CEE 471 Fundamentals of Structural Mechanics
Fall. 3 credits. Prerequisites: ENGRD 202, MATH 294. Senior for only by permission of the instructor. M. D. Grigoriu. Course 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 472 Finite Element Analysis of Solids and Structures
Spring. 3 credits. Prerequisites: CEE 371, CEE 372, and CEE 471. W. Aquino. This course covers the formulation of the finite element method in 2D and 3D continuum, basic 2D and 3D continuum isoparametric elements, plate and shell 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 the fundamental aspects of the method for making intelligent use of commercial software and obtaining a strong background for moving to further study and
research. Problems are drawn primarily from structural and solid mechanics.

**CEE 473 Design of Concrete Structures**
Fall. 4 credits. Prerequisite: CEE 341 or permission of instructor. K. C. Hover. Behavior and design of reinforced concrete and structures. Discussion of how forces are transferred through elements of building systems. Includes a semester project requiring the design of a reinforced concrete structure.

**CEE 474 Design of Metal Structures**
Fall. 4 credits. Prerequisite: CEE 341 or permission of instructor. T. Pekoz. Behavior and design of steel members, connections, and structures. Discussion of structural systems for buildings and bridges.

**CEE 475 Introduction to Composite Materials**
(also M&AE 455, MS&E 555, and T&M 455) Spring. 3 credits. L. Phoenix. For description, see T&M 455.

**[CEE 476 Evaluation and Failure of Structures**
Spring. 3 credits. Offered alternate years. Prerequisites: ENGRD 202, ENGRD 261, and ENGRD 203; CEE 371 and CEE 473. Not offered 2004–2005. M. J. Sansalone. This course covers the critical 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 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 477 Concrete Materials and Construction**
Spring. 3 credits. K. C. Hover. This course 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 478 Structural Dynamics and Earthquake Engineering**
Spring. 3 credits. M. D. Grigoriu. Modal analysis, numerical methods, and frequency-domain analysis. Introduction to earthquake-resistant design.

**[CEE 479 Collaborative, Distance Design of Structural Systems (also M&AE 491)**
Fall, spring. 8 credit hours. Students who enroll in CEE 479 are expected to take it in both the fall and spring semesters. Not offered 2004–2005. A. Ingraffea, S. Jones. This is a new senior-level design course, funded by NASA and the state of New York and taught jointly with Syracuse University. It emphasizes teamwork, collaboration at a distance, and multidisciplinary activities. The project is based on structural systems for a reusable launch vehicle. The course involves design, analysis, simulation, building, testing, virtual reality, and asynchronous learning environments. First semester covers conceptual design, study of advanced mechanics, materials, software applications, risk and cost analysis. The second semester involves detailed design, construction, testing, and simulation.

**CEE 481 LRFD-Based Engineering of Wood Structures**
(also BEE 481) Spring. 3 credits. Prerequisite: ENGRD 202. For description see BEE 481 in the College of Agriculture and Life Sciences section of this catalog.

**[CEE 490 Management Practice in Project Engineering**
Fall. 3 credits. Prerequisite: permission of instructor. Next offered 2007–2008. K. C. Hover. An introduction to the principles of project management. Planning, organizing, communicating, scheduling, and controlling of engineering work done in project teams.

**CEE 492 Engineers for a Sustainable World: Engineering in International Development**
Fall. 3 credits. R. A. Davidson 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 relationships between engineering and international development, the philosophy and politics of technology, and ethics in engineering practice.

**CEE 501/502 Design Project**
Fall, spring. 3 credits each term. Required for students in the M.Eng. (Civil) program.

CEE design projects present students with an exemplary design experience that reflects those carried out in the course of professional practice. Projects are typically formed by student design groups, and the topics reflect the diverse specialty areas of the Civil and Environmental engineering field as described below.

**CEE 501/502 Design Project in Structural Engineering**
Design of a major civil engineering project. Planning and a preliminary design are completed during the fall term; the final design is completed in the January intersession.

**CEE 501/502 Design Project in Geotechnical Engineering**
Design for a major geotechnical engineering project. Planning and preliminary design during the fall term, final design completed in January intersession.

**CEE 501/502 Design Project in Environmental Water Systems**
Design of a major water systems project.

**CEE 501/502 Design Project in Environmental Engineering**
Design of a major environmental engineering project.

**CEE 501/502 Design Project in Environmental Fluid Mechanics and Water Research**
Design of a major environmental systems fluid mechanics and water research project.

**CEE 502 Professional Practice and Ethics in Engineering**
Spring. 3 credits. Open to all engineering undergraduate seniors and graduate students; required for students in the M.Eng. (Civil) program. C. H. Trautmann. This course is designed to prepare students for professional practice by examining various nontechnical aspects of engineering, including finance, marketing, ethics, law, and management.

**CEE 504 Applied Systems Engineering**
(also COM S 504, ECE 512, M&AE 591, OARIE 512, SYSEN 510) Fall. 3 credits. Prerequisite: senior or graduate standing in an engineering field; concurrent or recent (in the past two years) enrollment in a group-based project with a strong system design component that is approved by a course instructor. A. R. George and R. Roundy. For description, see SYSEN 510.

**CEE 505 Applied Systems Engineering**
(also COM S 505, ECE 513, M&AE 592, OARIE 513, SYSEN 520) Spring. 3 credits. Prerequisite: Applied Systems Engineering I (CEE 504). COM S 504, ECE 512, M&AE 591, OARIE 512 or SYSEN 520). Staff. For description, see SYSEN 520.

**CEE 509 Heuristic Methods for Optimization**
(also COM S 572, CIS 572, ORB 533) Fall. 3 or 4 credits. Prerequisites: graduate standing or COM S, ENGRD 211, ENGRD 321, or CEE 241: ENGRD 241 or permission of instructor. C. A. Shoemaker and B. Selman. This course teaches heuristic search methods including simulated annealing, tabu search, genetic algorithms, derandomized evolution strategy, and random walk developed for optimization of combinatorial- and continuous-variable problems. Applications project options include wireless networks, genome mapping, job shop scheduling, partial differential equations, satisfiability, or independent projects. Statistical methods are presented for comparing search algorithm results. Advantages and disadvantages of heuristic search methods are discussed in parallel and serial computation are discussed in comparison with other optimization algorithms.

**CEE 590 Project Management**
Fall, spring. 4 credits. Prerequisite: permission of instructor. F. J. Wayno. A core graduate course in course management for people who will manage technical or engineering projects. Focuses both on the "technical" tools of project management (methods for planning, scheduling, and control) and the "human" side (forming a project team, managing performance, resolving conflicts, etc.). With somewhat greater emphasis on the latter.

**CEE 591 Engineering Management Project**
Fall. 3 credits. Prerequisite: permission of instructor. P. Carr. An intensive evaluation of the management aspects of a major engineering project or system. Most students work on a large group project in the area of project management. Students may also work singly or in small groups on an engineering management topic of special interest to them.
CEE 592 Engineering Management Project
Spring. 3 credits. Prerequisite: permission of instructor. P. Carr.
A continuation of CEE 591.

CEE 593 Engineering Management Methods: Data, Information, and Modeling
Fall. 3 credits. Prerequisites: CEE 323 and CEE 304 or equivalent. M. A. Turqanist.
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 project design, scheduling, operations, forecasting, and resource allocation.

CEE 594 Economic Methods for Engineering and Management (also EMSE 594)
Spring. 4 credits. Prerequisite: calculus, probability and statistics, and a course in economics. For seniors and graduate students or by permission of instructor. R. E. Schuler.
Economic concepts are introduced and used to select, calibrate and apply proper analytic decision tools in engineering design and management. Topics covered include: market analysis and pricing strategies; production choices and cost estimation; input acquisition and employee motivation; project evaluation and the cost of capital; decision-making in risky and uncertain environments; industry structure, bidding strategies and game theory; plus the regulatory and ethical consequences of overall managerial strategies.

CEE 595 Construction Planning and Operations
Fall. 3 credits. K. C. Hover.
A course on the fundamentals of construction planning: organization of the work site; construction planning, scheduling, and cost estimating; bidding; temporary structures; contract documents and the relationships among owners, designers, contractors, suppliers, and developers.

CEE 596 Management Issues in Forensic Engineering
Fall. 3 credits. J. G. Carr.
This course is an introduction to 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 597 Risk Analysis and Management
Spring. 3 credits. Prerequisite: An introduction to probability and statistics course such as CEE 304, ENGRD 270, ILRST 210, BTHY 261 or AEM 210; and two semesters of calculus. For seniors and graduate students or by permission of instructor. R. A. Davison.
Course develops a working knowledge of risk terminology and reliability engineering, analytic tools and models used to analyze environmental and technological risks, and social and psychological risk issues. Discussions address life risks in the United States historical accidents, natural hazards, transportation risks, industrial accidents, waste incineration, air pollution modeling, public health, regulatory policy, risk communication, and risk management.

CEE 598 Introduction to Decision Analysis
Fall. 3 credits. Prerequisite: an introduction to probability and statistics course such as CEE 304, ENGRD 270, ILRST 210, BTHY 261 or AEM 210. For seniors and graduate students or by permission of instructor. R. A. Davison.
Framework to structure the way we think about decision situations that are complicated by uncertainty, complexity, and competing objectives. Specific decision analysis concepts and tools, such as decision trees, sensitivity analysis, value of information, and utility theory. Applications to all areas of engineering and life. Includes a group project to analyze a real-world decision.

CEE 601 Seminar—Water Resources and Environmental Engineering
Fall. 1 credit. R. R. Mahon, simulation.
Presentation of topics of current interest.

CEE 602 Seminar—Civil Infrastructure
Fall, spring. 1 credit. Required for first-year graduate students. Staff.
Presentation of topics of current interest.

CEE 603 Seminar—Engineering Systems and Management
Fall. 1 credit. Staff.
Presentation of topics of current interest.

CEE 605 Seminar—Issues in Risk Analysis
Fall 1 credit. S-4 option. Staff.
Discussion of current issues and ongoing research on risk analysis issues from many perspectives with an emphasis on environmental risk analysis. Speakers address problem formulation, quantitative/qualitative methods in assessment of risk, communication issues, and challenges to risk assessment methodologies. Some sessions held jointly with other seminar series. Enrollment in seminar requires short reports and participation in three required discussion meetings for class members designed to integrate the issues raised during the semester.

CEE 606 Civil Infrastructure Systems
Spring. 3 credits. Letter or S/U grades. Prerequisites: probability and statistics (CEE 304 or equivalent) and engineering economics (CEE 325 or equivalent). L. K. Nozick.
This course is an introduction to the framing and solution of civil infrastructure problems using a systems engineering approach. Systems tools, such as optimization, life-cycle cost analysis, decision analysis, simulation, and Markov modeling, and risk analysis, are examined through case studies related to civil infrastructure.

CEE 610 Remote Sensing Fundamentals (also CSS 660)
Fall. 3 credits. Prerequisite: permission of instructor. W. D. Philpot.
An introduction to equipment and methods used in obtaining information about earth resources and the environment from aircraft or satellite. Coverage includes sensors, sensor and ground-data acquisition, data analysis and interpretation, and project design.

CEE 615 Digital Image Processing
Spring. 3 credits. Prerequisite: facility with algebra, trigonometry, and basic statistics or permission of instructor. 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 617 Special Topics—Remote Sensing
On demand. 1-6 credits. W. D. Philpot.
Students may elect to undertake a project in remote sensing. The work is supervised by a professor in this subject area.

CEE 620 Water-Resources Systems Engineering
Spring. 3 credits. Prerequisites: CEE 523 and CEE 593 or BEE 475. D. P. Lukacs.
Development and application of deterministic and stochastic optimization and simulation models for water-resource planning and management. Covers river-basin modeling, including reservoir design and operation, irrigation planning and operation, hydropower-capacity development, flow augmentation, flood control and protection, and water-quality planning and control.

CEE 621 Stochastic Hydrology
Spring. 3 credits. Prerequisites: CEE 304 or permission of instructor. Not offered 2004–2005. J. R. Stedinger.
Course examines statistical, time series, and stochastic optimization methods used to address water resources planning and management problems involving uncertainty 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 623 Environmental Quality Systems Engineering
Fall. 3 credits. Prerequisites: MATH 294, optimization, and graduate standing or permission of instructor. Not offered 2004–2005. 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 626 Case Studies in Environmental Fluid Mechanics
An introduction to fundamental fluid mechanics and transport processes of the environment through laboratory- and field-based studies (Guyuga 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 laboratory- and field projects. Course includes a design project.
CEE 628 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 topics related to ongoing activities in the fluid mechanics and related environmental systems planning and analysis.

CEE 631 Computational Simulation of Flow and Transport in the Environment
Spring. 3 credits. Prerequisites: MATH 294 or equivalent, ENGRD 241 or experience in numerical methods and programming, and CEE 331 or equivalent. Not offered 2005–2006. P. L.-F. Liu.
This course 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. The course teaches various numerical methods including finite difference, finite elements, and boundary elements.

CEE 632 Hydrology
Spring. 3 credits. Prerequisite: CEE 531. 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 flow; and nonlinear hydraulic processes; and storage routing and unit hydrograph methods.

CEE 633 Flow in Porous Media and Groundwater
Fluid mechanics and equations of single-phase and multiphase flow; methods of solution. Applications include aquifer hydraulics, pumping wells, drought flows, infiltration, groundwater recharge; land subsidence; seawater intrusion; miscible displacement; and transient seepage in unsaturated materials.

CEE 634 Boundary Layer Meteorology
Fall. 3 credits. Prerequisite: CEE 331 or permission of instructor. Not offered 2004–2005. W. H. Brutsaert.
Physical processes in the lower atmospheric environment: turbulent transport in the atmospheric boundary layer, surface-air interaction, disturbed boundary layers, radiation. Applications include sensible and latent heat transfer from lakes, plant canopy flow and evapotranspiration, turbulent diffusion from chimneys and cooling towers, and related design issues.

CEE 635 Small and Finite Amplitude Water Waves
Review of linear and nonlinear theories of ocean waves. Discussions on the applicability of different wave theories to engineering problems.

CEE 636 Environmental Fluid Mechanics
Course covers analytic and modeling perspectives of environmental flows; mechanics of layered and continuously stratified 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 637 Experimental Methods in Fluid Dynamics (also M&AE 627)
Spring. 4 credits. Prerequisites: CEE 331 or equivalent and CEE 304 or equivalent (both may be taken concurrently). Not offered 2004–2005. E. A. Cowen.
Introduction to experimental data collection and analysis, in particular as they pertain to fluid flows. Covers: computer-based experimental control, analog and digital data acquisition, discrete sampling theory, digital signal processing, uncertainty analysis. Also covers: analog transducers, acoustic and laser Doppler velocimetry, full-field (2-D) quantitative imaging techniques. Includes laboratory experiments and a project.

CEE 638 Seminar—Hydraulics
Spring. 1 credit. Open to undergraduates and graduates and required of graduate students majoring in hydraulics or hydraulic engineering. Staff.
Topics of current interest in fluid mechanics, hydraulic engineering, and hydrology.

CEE 639 Special Topics in Hydraulics
On demand. 1–6 credits. Staff.
Special topics in fluid mechanics, hydraulic engineering, or hydrology.

CEE 640 Foundation Engineering
Fall. 3 credits. Prerequisite: CEE 341. F. H. Kulhawy.
This course covers soil exploration, sampling, and in-situ testing techniques; bearing capacity, stress distribution, and settlement; design of shallow foundations; compaction and site preparation; and seepage and dewatering of foundation excavations.

CEE 641 Retaining Structures and Slopes
Spring. 3 credits. Prerequisite: CEE 341. T. D. O'Rourke.
Course covers: Earth pressure theories; design of rigid, flexible, braced, tied-back, slurry, 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 644 Environmental Site and Remediation Engineering
Spring. 3 credits. Prerequisite: CEE 341 or equivalent or permission of instructor. T. D. O'Rourke.
Covers principles of hydrogeology, contaminant migration, and remediation technologies related to geotechnical and environmental engineering. Emphasis is on 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 649 Special Topics in Geotechnical Engineering
On demand. 1–6 credits. Staff.
Supervised study of special topics not covered in the formal courses.

CEE 653 Water Chemistry for Environmental Engineering
Fall. 3 credits. Prerequisite: 1 semester of college chemistry or permission of instructor. L. W. Lion.
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. The focus of the course is on the mathematical description of chemical reactions relevant to engineered processes and natural systems, and the numerical or graphical solution of these problems.

CEE 654 Aquatic Chemistry
Concepts of chemical equilibria applied 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- and bioequilibrum computational techniques. In-depth coverage of topics covered in CEE 653.

CEE 655 Transport, Mixing, and Transformation in the Environment
Fall. 3 credits. Prerequisite: CEE 331. P. L.-F. Liu.
Application of fluid mechanics to problems of transport, mixing, and transformation in the water environment. Introduction to advective, diffusive, and dispersive processes in the environment. Boundary interactions: air-water and sediment-water processes. Introduction to chemical and biochemical transformation processes. Applications to transport, mixing, and transformation in rivers, lakes, and coastal waters.

CEE 656 Physical/Chemical Process
Fall. 3 credits. Prerequisite: previous or concurrent enrollment in CEE 653 or permission of instructor. J. J. Bisogni.
Theoretical and engineering aspects of chemical and physical phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes and to their transformation in the environment. Analysis and design of treatment processes and systems.

CEE 657 Biological Processes
Spring. 3 credits. Prerequisites: an introductory course in microbiology and CEE 656, 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. Biogeochemistry analysis, stoichiometry, biokinetic, and design of biological treatment process.
CEE 658 Microbial Biodegradation and Biocatalysis Lab
Spring. 3 credits. Prerequisites: CEE 451 or BIOM 250 or equivalent; CEE 351 or CHEM 390 or permission of instructor. M. E. Richardt.
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 biocatalysis capabilities, effects of environmental parameters and cell-to-cell communication on gene expression, methods in microbial molecular biology, and contemporary case studies in biodegradation and biocatalysis. Laboratory sessions give students hands-on experience in molecular and analytical methods. Student teams design and then construct a bioreactor employing their own environmental isolates that degrade a selected contaminant or produce a desired compound.

CEE 659 Seminar—Environmental Quality Engineering
Spring. 1 credit. Prerequisite: enrollment as graduate student in environmental engineering. Staff.
Presentation and discussion of current research in environmental engineering.

[CEE 661 Urban Transportation Planning and Modeling
Fall. 3 credits. Prerequisite: CEE 361 or permission of instructor. Offered alternate years. Next offered 2005-2006. A. H. Meyburg.]
This course covers modern transportation planning practice and the analytical tools that are necessary to engage in this field. Emphasis is on passenger transportation in the urban context. The legislative, political, and economic contexts of urban transportation planning (UTP) are discussed. The course presents the travel demand estimation process and the associated models and approaches and provides insights in travel survey data acquisition.

CEE 662 Urban Transportation Network Design and Analysis
Fall. 3 credits. Prerequisite: CEE 361 or permission of instructor. L. K. Nozick.
This course covers the development and use of mathematical models for the design and analysis of urban transportation networks, including formulations and solution procedures based on user equilibrium and stochastic user equilibrium. Students apply these tools to a substantive real-world case study.

[CEE 663 Network Flows and Algorithms
Spring. 3 credits. Prerequisite: CEE 662 or permission of instructor. Offered alternate years. Not offered 2004-2005. M. A. Tunniss.]
Algorithms for network flow problems encountered in transportation systems modeling, including shortest path, multiobjective shortest path, minimum cost flows, multi-commodity flows and generalized flows, are presented. Applications to vehicle routing, dynamic vehicle allocation, and network design are included.

CEE 671 Fundamentals of Structural Mechanics
Fall. 3 credits. Prerequisites: ENGRD 202, MATH 294. Primarily for seniors or by permission of instructor. M. D. Grigoriu.
Course topics include beam bending, beams on elastic foundation, stability analysis for columns and beam-columns, linear elasticity, numerical solutions for linear elasticity problems, and applications including stress concentration, torsion, and plates.

CEE 672 Finite Element Analysis of Solids and Structures
Spring. 3 credits. Prerequisites: CEE 371, CEE 372, and CEE 471. W. Aquino.
This course covers the formulation of the finite element method in 2D and 3D continuum isoparametric elements, plate and shell 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. Problems are drawn primarily from structural and solid mechanics.

CEE 673 Design of Concrete Structures
Fall. 4 credits. Prerequisite: CEE 341 or permission of instructor. K. C. Hover.
This course covers the behavior and design of reinforced concrete and structures. Discussion of how forces are transferred through elements of building system is included. A semester project is assigned requiring the design of a reinforced concrete structure.

CEE 674 Design of Metal Structures
Fall. 4 credits. Prerequisite: CEE 341 or permission of instructor. T. Pekoz.
This course covers the behavior and design of steel members, connections, and structures. Discussion of structural systems for buildings and bridges is included.

CEE 675 Concrete Materials and Construction
Spring. 3 credits. K. C. Hover.
This course 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 676 Finite Element Analysis (also T&AM 666 and M&AE 680)
Spring. 3 credits. Staff.
This course covers the conceptual, theoretical, and practical basis for finite element analysis in engineering, with emphasis on structural, mechanical, and thermal problems. It focuses on the FEM as a method for numerically solving partial differential equations. Topics include strong and weak problem forms; weighted-residual and variational formulations; formulations for elliptic, parabolic, and hyperbolic problems (Laplace's equation, elasticity, heat conduction, structural dynamics, wave propagation); meshing and error estimation and various kinds of elements.

CEE 677 Engineering Analysis

CEE 678 Structural Dynamics and Earthquake Engineering
Spring. 3 credits. M. D. Grigoriu.
Modal analysis, numerical methods, and frequency-domain analysis. Introduction to earthquake-resistant design.

CEE 679 Evaluation and Failure of Structures
Spring. 3 credits. Offered alternate years. Not offered 2004-2005. M. J. Sansalone. 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 design 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 692 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 694 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 697 Special Topics in Structural Engineering
On demand. 1-6 credits. Staff.
Individually supervised study of one or more 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 710 Research—Remote Sensing
On demand. 1-6 credits. W. D. Philpot.
For students who want to study one particular area in depth. The work may take the form of laboratory investigation, field study, theoretical analysis, or development of design procedures.

CEE 722 Environmental and Water Resources Systems Analysis Research
On demand. 1-6 credits. Prerequisite: permission of instructor. Preparation must be suitable to the investigation to be undertaken. Staff.
Investigations of particular environmental or water resources systems problems.

**CEE 729 Special Topics in Environmental or Water Resources Systems Analysis**
On demand. 1-6 credits. Staff. Supervised study, by individuals or small groups, of one or more specialized topics not covered in regular courses.

**CEE 735 Research in Hydraulics**
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 of the form of a research report.

**CEE 740 Engineering Behavior of Soils**
Fall. 3 credits. Prerequisite: CEE 341. H. E. Stewart.

**CEE 741 Rock Engineering**
Fall. 3 credits. Prerequisite: CEE 341 or permission of instructor. Recommended: introductory geology. T. D. O'Rourke.
Geological and engineering classifications of intact rock, discontinuities, and rock masses. Includes laboratory and field evaluation of properties. Covers stress states and stress analysis, design of foundations on, and openings in, rock masses, and analysis of the stability of rock slopes.

**CEE 744 Advanced Foundation Engineering**
Spring. 2 credits. Prerequisite: CEE 640. F. H. Kulhawy.
A continuation of CEE 640, 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 745 Soil Dynamics**
Spring. 2 credits. Prerequisite: permission of instructor. Next offered spring 2006. 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 746 Embankment Dam Engineering**
Spring. 2 credits. Prerequisite: CEE 641 and 741, or permission of instructor. Not offered 2004–2005. F. H. Kulhawy.
Principles of analysis and design for earth and rockfill dams. Materials, construction methods, internal and external stability, seepage and drainage, performance (monitoring, abatement and foundation evaluation. Introduction to tailings dams.)

**CEE 749 Research in Geotechnical Engineering**
On demand. 1-6 credits. Staff.
For students who want to pursue a particular geotechnical topic in considerable depth.

**CEE 750 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 759 Special Topics in Environmental Engineering**
On demand. 1-6 credits. Staff. Supervised study in special topics not covered in formal courses.

**CEE 762 Practicum in Modeling Transportation Systems**
Fall. 3 credits. Prerequisites: CEE 661, CEE 662, and CEE 663. Offered alternate years. L. K. Nozik.
Students develop appropriate models and practical solution procedures for decision making in transportation systems. Alternative approaches are compared by assessing the strengths and weaknesses of each. Case studies and model implementation skills are included.

**CEE 764 Special Topics in Transportation**
On demand. 1-6 credits. Staff.
Advanced subject matter not covered in depth in other regular courses.

**CEE 770 Engineering Fracture Mechanics**
Fall. 3 credits. Prerequisite: CEE 672 or CEE 772 (M&AE 680/T&AM 666) and T&AM 753, or permission of instructor. Offered alternate years. Next offered 2005–2006. A. Ingraffea.
Computational and physical modeling of crack growth processes. Finite and boundary element-based simulation of brittle fracture initiation and propagation, fatigue crack growth, and elastic-plastic and cohesive approaches to inelastic crack growth. Element formulation, meshing and remeshing, interactive steering. Case studies across scales from geomechanics to micromechanics, and including metals, ceramics, and polymers. Laboratory techniques for fracture toughness, crack growth rate, and trajectory testing.

**CEE 771 Stochastic Mechanics in Science and Engineering**
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 2004–2005. M. D. Grigoriu.
Review of probability theory, stochastic processes, and Itô 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 input. Applications include: solution of Laplace, transport, Schrodinger, and other deterministic partial differential equations, dynamic systems subjected to Gaussian and non-Gaussian noise, random eigenvalue problems, and homogenization, structure evolution, and pattern formation for random heterogeneous materials.

**CEE 772 Random Vibration**
Fall. 3 credits. Prerequisites: M&AE 326 and OR&IE 260, or equivalent, and permission of instructor. Not offered 2004–2005. M. D. Grigoriu.
Review of random-process theory, simulation, and first-passage time. Linear random vibration: 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 773 Structural Reliability**
Fall. 3 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 2004–2005. M. D. Grigoriu.
Review of probability theory, practical measures for structural reliability, second-moment reliability indices, probability models for strength and loads, probability-based design codes, reliability of structural systems, imperfection-sensitive structures, fatigue, stochastic finite-element techniques, and elementary concepts of probabilistic fracture mechanics.

**CEE 774 Advanced Structural Concrete**
Fall. 3 credits. W. Aquino.
The fundamental aspects of the mechanical behavior of concrete subjected to axial and multiaxial states of stress, rate effects, time-dependent deformations, and multi-axial modeling are covered. The behavior of reinforced concrete membrane elements subjected to plane states of stress, torsion, limit analysis is included, and an introduction to finite element modeling of reinforced concrete structures is given.

**CEE 775 Mathematical and Computer Modeling of Material Behavior**
Spring. 3 credits. Prerequisites: T&AM 663 or equivalent course in solid mechanics and T&AM 611 or equivalent. Offered every other year; not offered 2004–2005. W. Aquino.
This course covers the fundamental physical and mathematical aspects of formulating material models for use in numerical schemes such as the finite element method. Possible topics covered in this course include basic plasticity and damage mechanics, numerical integration of plasticity equations, plastic-damage models, coupled models (temperature-deformation), and emerging techniques for constitutive modeling using neural networks and genetic algorithms. Applications include engineering materials such as concrete, soils, metals, and composites.

**CEE 776 Advanced Topics in Stability**
Fall. 3 credits. Prerequisite: CEE 574 or equivalent. T. Pelcza.
Preliminary design of structural systems. Behavior and design of members and connections. Behavior and computer-aided design of building frames.

**CEE 777 Computational Solid and Structural Mechanics**
Spring. 3 credits. Prerequisites: T&AM 663 or CEE 771, CEE 771 with approval of instructor, CEE 672 or CEE 676 or equivalent background. Offered every other year. K. D. Papoulia.
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, 1st and 2nd 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 778 Natural Disaster Risk Assessment and Management
Spring. 3 credits. Offered alternate years. Next offered spring 2005. R. A. Davidson. This course explores ways to define, measure, and manage natural disaster risk using systems engineering, civil engineering, and social science perspectives and analysis tools. Multiple hazards and multiple viewpoints (local, international, individual, public sector, private sector) are considered.]

CEE 783 Civil and Environmental Engineering Materials Project
On demand. 1-3 credits. Staff. Individual projects or reading and study assignments involving engineering materials.

CEE 785 Research in Structural Engineering
On demand. 1-6 credits. Staff. Pursuit of a branch of structural engineering beyond what is covered in regular courses. Theoretical or experimental investigation of suitable problems.

CEE 786 Fracture Mechanics
Spring. 3 credits. L. Banks-Sills. This course covers the basic principles of linear elastic fracture mechanics (LEFM): asymptotic expansion of stresses and displacements at a crack tip, Griffith's criterion, and plastic region at a crack tip. Topics include simple methods for calculating stress intensity factors, energy principles, energy release rate, compliance, and J-integral; experiments in fracture mechanics: plane strain fracture toughness K_{IC}, plane stress fracture toughness K_{IC}, fracture mechanics: plane strain fracture toughness K_{IC}, plane stress fracture toughness K_{IC}, and plane strain fracture toughness K_{IC}. Experiments at the crack tips: HRR singularity, small- and large-scale yielding, J dominance, and J_{IC} experiments.

CEE 810 Thesis—Remote Sensing
Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. W. D. Philpot. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

CEE 820 Thesis—Environmental and Water Resource Systems
Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. Staff. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

CEE 821 Thesis—Environmental and Public Systems
Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. Staff. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

CEE 830 Thesis—Fluid Mechanics and Hydrology
Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. Staff. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

CEE 831 Thesis—Hydraulics/Hydrology
Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. Staff. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

CEE 840 Thesis—Geotechnical Engineering
Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. Staff. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

CEE 850 Thesis—Environmental Engineering
Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. Staff. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

CEE 851 Thesis—Environmental Quality Engineering
Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. Staff. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

CEE 860 Thesis—Transportation Engineering
Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. Staff. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

CEE 880 Thesis—Structural Engineering
Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. Staff. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.
COM S 201 Cognitive Science in Context (also COGST 201 and PSYCH 201)
Spring. 4 credits. Limited to 24 students. Prerequisite: concurrent or prior registration in Introduction to Cognitive Science (PSYCH 102/COGST 101/COM S 101/LING 170/PHIL 191) is suggested but not required. Knowledge of programming languages is not assumed. Fall, B. Halpern and staff; spring, D. Field and staff. For description, see COGST 201.

COM S 211 Computers and Programming (also ENGRD 211)
Fall, spring, summer. 3 credits. Prerequisite: COM S 100 or an equivalent course in Java or C++.

COM S 212 Java Practicum
Fall, spring, summer. 1 credit. Letter grade only. Pre- or corequisite: COM S/ENGRD 211.

COM S 213 C++ Programming
Spring. 2 credits. Prerequisite: COM S 100 or equivalent programming experience. Students who plan to take COM S 113 and 213 must take 113 first. S-U grades only.

COM S 214 Advanced UNIX Programming and Tools
Spring. 1 credit. Usually weeks 5-8. Prerequisite: COM S 114 or equivalent. S-U grades only.

COM S 215 Introduction to C
Fall, spring. 1 credit. Usually weeks 5-8. Prerequisite: COM S 114 or equivalent. S-U grades only.

COM S 230 Intermediate Design and Programming for the Web (also INFO 230)
Spring. 3 credits. Prerequisite: COM S 150 or equivalent knowledge.

COM S 280 Discrete Structures
Fall, spring. 3 credits. Pre- or corequisite: COM S/ENGRD 211 or permission of instructor.

COM S 312 Data Structures and Functional Programming
Fall, spring. 4 credits. Prerequisite: COM S 211/212 or equivalent programming experience. Should not be taken concurrently with COM S 314.

COM S 314 Computer Organization (also ECE 314)
Fall, spring. 4 credits. Prerequisite: COM S 211. COM S 312 or ENGRD 230 are recommended but not required. Should not be taken concurrently with COM S 312.

COM S 321 Numerical Methods in Computational Molecular Biology (also BIOBM 321 and ENGRD 321)
Fall. 3 credits. Prerequisites: at least one course in calculus, such as MATH 106, 111, or 191 and a course in linear algebra, such as MATH 221 or 294 or BTRY 417. COM S 100 or equivalent and some familiarity with iteration, arrays, and procedures. COM S majors and minors may use only one of the following toward their degree: COM S 211, 321, 421, or 428. Not offered fall 2004.

COM S 322 Introduction to Scientific Computation (also ENGRD 322)
Spring, summer. 3 credits. Prerequisites: COM S 100 and (MATH 221 or MATH 294). COM S majors and minors may use only one of the following toward their degree: COM S 321, 322, 421, or 428.

COM S 324 Computational Linguistics (also COGST 424, LING 424)
Fall, spring. 4 credits. Prerequisites: LING 203; labs involve work in the Unix environment; COM S 114 recommended. For description, see LING 424.

COM S 330 Applied Database Systems (also INFO 330)
Fall. 3 credits. Prerequisite: COM S 211/ENGRD 211. COM S majors may use only one of the following toward their degree: COM S/INFO 330 or COM S 433.

COM S 381 Introduction to Theory of Computing
Fall, summer. 3 credits. Prerequisite: COM S 280 or permission of instructor. Credit will not be granted for both COM S 381 and COM S 481. Corrective transfers between COM S 381 and COM S 481 (in either direction) are encouraged during the first few weeks of instruction.

COM S 400 The Science of Programming
Fall. 3 credits. Prerequisite: COM S 211.

COM S 411 Programming Languages
Fall. 4 credits. Prerequisite: COM S 312 or permission of instructor.

COM S 412 Introduction to Compilers
Spring. 3 credits. Prerequisites: COM S 312 (or permission of instructor) and COM S 314. Corequisite: COM S 413.

COM S 413 Practicum in Compilers
Spring. 2 credits. Corequisite: COM S 412.

COM S 414 Systems Programming and Operating Systems
Fall, spring, summer. 3 credits. Prerequisites: COM S 211, 212, 312 (or permission of instructor), and 314. Corequisite: COM S 415 in spring only.

COM S 415 Practicum in Operating Systems
Fall, spring. 2 credits. Corequisite: COM S 414.

COM S 419 Computer Networks (formerly COM S 519)
Spring. 4 credits. Prerequisite: COM S 211, COM S 312, or ENGRD 230 are recommended but not required, or permission of instructor. Not offered every year.

COM S 421 Numerical Analysis
Fall. 4 credits. Prerequisite: MATH 294 or equivalent, one additional mathematics course numbered 300 or above, and knowledge of programming. COM S majors and minors may use only one of the following toward their degree: COM S 321, 322, 421, or 428.

COM S 426 Introduction to Computational Biology
Fall. 3 credits. Prerequisites: COM S/ENGRD 211, COM S 280.

COM S 427 Practicum in Computational Biology
Fall. 2 credits. Pre- or corequisite: COM S 426.

COM S 428 Introduction to Computational Biophysics
Fall. 3 credits. Prerequisite: COM S 100, CHEM 211, or equivalent. MATH 293 or MATH 294, PHYS 112 or 215, or permission of instructor. BIOLBM 330 recommended. COM S majors and minors may use only one of the following toward their degree: COM S 321, 322, 421, or 428.

COM S 430 Information Retrieval (also INFO 430)
Fall. 3 credits. Prerequisite: COM S 211 or equivalent.

COM S 431 Web Information Systems (also INFO 431; formerly CIS 502)
Spring. 3 credits. Prerequisites: COM S 211 and some familiarity with the technology of web sites.

COM S 432 Introduction to Database Systems
Fall. 3 credits. Prerequisites: COM S 312, or 211/212, and permission of instructor. Recommended: COM S 213 and strong programming skills in C or C++.

COM S 433 Practicum in Database Systems
Fall. 2 credits. Corequisite: COM S 432. COM S majors may use only one of the following toward their degree: COM S/INFO 330 or COM S 433.

COM S 485 Computer Graphics I (also ARCH 374)
Fall. 4 credits. Prerequisite: COM S/ENGRD 211. May not be taken after completion of COM S 417.

COM S 467 Computer Graphics II
Spring. 3 credits. Prerequisite: COM S 465.

COM S 468 Computer Graphics Practicum
Spring. 2 credits. Prerequisite: COM S 465. Corequisite: COM S 467.

COM S 472 Foundations of Artificial Intelligence
Fall. 3 credits. Prerequisites: COM S/ENGRD 211 and COM S 280 (or equivalent).

COM S 473 Practicum in Artificial Intelligence
Fall. 2 credits. Corequisite: COM S 472.

COM S 474 Introduction to Natural Language Processing (also COGST 474, LING 474)
Fall. 4 credits. Prerequisites: COM S 211.

COM S 478 Machine Learning
Spring. 4 credits. Prerequisites: COM S 280, 312, and basic knowledge of linear algebra and probability theory.

COM S 480 Introduction to Cryptology (also MATH 335)
Fall. 3 credits. Prerequisites: COM S 100 and MATH 222 or 294. Students who take this course may not also receive credit for MATH 336. For description, see MATH 335.

COM S 481 Introduction to Theory of Computing
Fall. 4 credits. Prerequisite: COM S 280 or permission of instructor. Credit will not be granted for both COM S 381 and 481. Corrective transfers between COM S 481 and 381 (in either direction) are encouraged during the first few weeks of instruction.
COM S 482 Introduction to Analysis of Algorithms
Spring, summer. 4 credits. Prerequisites: COM S 280, 312, and either 381 or 481, or permission of instructor.

COM S 483 Quantum Computation (also PHYS 481 and 681)
Spring. 2 credits. Prerequisite: familiarity with the theory of vector spaces over the complex numbers. Not offered every year. For description, see PHYS 481.

COM S 486 Applied Logic (also MATH 486)
Fall or spring. 4 credits. Prerequisites: MATH 222 or 294, COM S 280 or equivalent (such as MATH 332, 432, 434, 481), and some additional course in mathematics or theoretical computer science.

COM S 490 Independent Reading and Research
Fall, spring. 1–4 credits.

COM S 501 Software Engineering
Spring. 4 credits. Prerequisite: COM S 211 or equivalent experience programming in Java or C++.

COM S 504 Applied Systems Engineering (also CEE 504, ECE 512, MAE 591, OR&IE 512, SYSEN 510)
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 a strong system design component that is approved by a course instructor. For description, see SYSEN 510.

COM S 505 System Architecture, Behavior, and Optimization (also CEE 505, ECE 513, MAE 592, OR&IE 513, SYSEN 520)
Spring. 3 credits. Prerequisite: Applied System Engineering (CEE 504, COM S 504, ECE 512, MAE 591, OR&IE 512). For description, see SYSEN 520.

COM S 513 System Security
Fall. 4 credits. Prerequisites: COM S 414 or 419 and familiarity with JAVA or C programming languages.

COM S 514 Intermediate Computer Systems
Spring. 4 credits. Prerequisites: COM S 414 or permission of instructor.

COM S 522 Computational Tools and Methods for Finance
Spring. 4 credits. Prerequisites: programming experience (e.g., C, FORTRAN, or MATLAB), some knowledge of numerical methods, especially numerical linear algebra. Not offered every year.

COM S 530 The Architecture of Large-Scale Information Systems (also INFO 530)
Spring. 4 credits. Prerequisite: COM S/INFO 350 or COM S 342.

COM S 565 Computer Animation (also ART 372, CIS 565; formerly CIS/COM S 518)
Fall. 4 credits. Prerequisite: COM S/ENGRD 211.
For description, see ART 372.

COM S 572 Heuristic Methods for Optimization (also CEE 509, CIS 527, OR&IE 533)
Spring. 3 or 4 credits. Prerequisites: COM S/ENGRD 211 or 322 or CEE/ENGRD 241 or graduate standing, or permission of instructor. Not offered every year. For description, see CEE 509.

COM S 578 Empirical Methods in Machine Learning and Data Mining
Fall. 4 credits. Prerequisites: COM S 280 and 312 or equivalent.

COM S 611 Advanced Programming Languages
Fall. 4 credits. Graduate standing or permission of instructor.

COM S 612 Compiler Design for High-Performance Architectures
Spring. 4 credits. Prerequisites: COM S 314 and 412 or permission of instructor.

COM S 614 Advanced Systems
Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor.

COM S 615 Peer-to-Peer Systems
Spring. 4 credits. Prerequisites: COM S 614 recommended.

COM S 619 Advanced Computer Networks
Fall. 4 credits. Prerequisite: COM S 419 or COM S 519, or permission of instructor. Not offered every year.

COM S 621 Matrix Computations
Fall. 4 credits. Prerequisites: MATH 411 and 431 or permission of instructor.

COM S 622 Numerical Optimization and Nonlinear Algebraic Equations
Spring. 4 credits. Prerequisite: COM S 621. Offered odd-numbered years only.

COM S 624 Numerical Solution of Differential Equations
Spring. 4 credits. Prerequisites: previous exposure to numerical analysis (e.g., COM S 421 or 621) and differential equations, and knowledge of MATLAB. Offered in even-numbered years.

COM S 626 Computational Molecular Biology
Spring. 4 credits. Prerequisites: familiarity with linear programming, numerical solutions of ordinary differential equations, and nonlinear optimization methods.

COM S 627 Computational Biology: The Machine Learning Approach
Spring. 4 credits. Prerequisites: COM S 420 or 626 and COM S 478 or 578 or permission of instructor.

COM S 630 Representing and Accessing Digital Information (also INFO 630)
Fall. 4 credits. Prerequisites: COM S 472 or 478 or 578 or the equivalent.

COM S 632 Database Systems
Spring. 4 credits. Prerequisites: COM S 432/433 or permission of instructor.

COM S 633 Advanced Database Systems
Spring. 4 credits.

COM S 664 Machine Vision
Fall. 4 credits. Prerequisites: undergraduate-level understanding of algorithms and MATH 221 or equivalent.

COM S 665 Advanced Rendering
Fall or spring. 4 credits. Prerequisites: COM S 465 and 467 or equivalent and an undergraduate-level understanding of algorithms, probability and statistics, vector calculus, and programming.

COM S 667 Physically Based Rendering
Fall or spring. 4 credits. Prerequisites: COM S 465 and 467 or equivalent and an undergraduate-level understanding of algorithms, programming, and vector calculus.

COM S 671 Introduction to Automated Reasoning
Fall or spring. 4 credits. Prerequisite: COM S 611 and graduate standing or permission of instructor.

COM S 672 Advanced Artificial Intelligence
Spring. 4 credits. Prerequisites: COM S 472 or permission of instructor.

COM S 673 Integration of Artificial Intelligence and Operations Research (also CIS 673)
Spring. 3 credits.

COM S 674 Natural Language Processing
Spring. 3 credits. Prerequisites: COM S 472 or permission of instructor. COM S 474 is NOT a prerequisite. Not offered every year.

COM S 676 Reasoning about Knowledge
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic.

COM S 677 Reasoning about Uncertainty
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic.

COM S 678 Advanced Topics in Machine Learning
Spring. 4 credits. Prerequisites: COM S 478 or equivalent, or COM S 578 or equivalent, or permission of instructor.

COM S 681 Analysis of Algorithms
Fall. 4 credits. Prerequisite: COM S 482 or graduate standing.

COM S 682 Theory of Computing
Spring. 4 credits. Prerequisite: COM S 381 or 481 and COM S 482 or 681 or permission of instructor.

COM S 683 Advanced Design and Analysis of Algorithms
Spring. 4 credits. Prerequisites: COM S 681 or permission of instructor. Not offered every year.

COM S 684 Algorithmic Game Theory
Spring. 4 credits. Prerequisites: COM S 681 or permission of instructor. Not offered every year.

COM S 685 The Structure of Information Networks (also INFO 685)
Spring. 4 credits. Prerequisite: COM S 482.

COM S 696 Logics of Programs
Spring. 4 credits. Prerequisites: COM S 481, 682, and MATH 481 or MATH/COM S 486. Not offered every year.

COMPUTER SCIENCE 251
COM S 709 Computer Science Colloquium  
Fall, spring. 1 credit. S-U grades only.  
For staff, visitors, and graduate students  
interested in computer science.

COM S 711 Seminar in Advanced Programming Languages  
Fall, spring. 3 credits.

COM S 713 Seminar in Systems and Methodology  
Fall, spring. 4 credits. Prerequisites:  
a graduate course employing formal reasoning such as COM S 611, 613, 671, a  
logic course, or permission of instructor.  
Not offered every year.

COM S 715 Seminar in Programming Refinement Logics  
Fall, spring. 4 credits. Prerequisite:  
COM S 612 or permission of instructor.  
Not offered every year.

COM S 717 Topics in Parallel Architectures  
Fall. 4 credits. Prerequisite: COM S 612 or  
permission of instructor. Not offered every year.

COM S 718 Computer Graphics Seminar  
Fall, spring. 4 credits.

COM S 719 Seminar in Programming Languages  
Fall, spring. 4 credits. Prerequisite: COM S 611 or permission of instructor. S-U grades  
only.

COM S 721 Topics in Numerical Analysis  
Fall, spring. 4 credits. Prerequisite: COM S 621 or permission of instructor.

COM S 726 Problems and Perspectives in Computational Molecular Biology  
(also PL BR 726)  
Fall, spring. 1 credit. S-U grades only.

COM S 732 Seminar in Database Systems  
Fall, spring. 4 credits. S-U grades only.

COM S 750 Evolutionary Computation and Design Automation  
(also CIS 750, MAE 650)  
Fall. 4 credits. Prerequisite: programming experience or permission of instructor.

[COM S 751 Media Research and Critical Design  
(also CIS 751)  
Fall. 4 credits. Prerequisites: graduate standing in COM S or equivalent ability to  
read technical research papers. Contact instructor if unsure of qualifications. Not  
offered every year.]

[COM S 752 Seminar on Scholarly Information Architecture  
(also CIS 752)  
Fall. 3 credits. Prerequisite: concurrent enrollment in COM S 502 or equivalent  
coursework. S-U grades only. Not offered every year.]

COM S 754 Systems Research Seminar  
Fall, spring. 1 credit. S-U grades only.

COM S 772 Seminar in Artificial Intelligence  
Fall, spring. 4 credits. Prerequisites: permission of instructor. S-U grades only.

COM S 775 Seminar in Natural Language Understanding  
Fall, spring. 2 credits.

COM S 786 Introduction to Kleene Algebra  
Spring. 4 credits. Prerequisites: COM S 481 required; COM S 482 or 681, COM S 682, elementary logic (MATH 481 or 681);  
Algebra (MATH 432) recommended.

COM S 789 Seminar in Theory of Algorithms and Computing  
Fall, spring. 4 credits. Prerequisite: permission of instructor. S-U grades only.

COM S 790 Special Investigations in Computer Science  
Fall, spring. Prerequisite: permission of a computer science adviser. Letter grade only.

COM S 990 Special Investigations in Computer Science  
Fall, spring. Prerequisite: permission of a computer science adviser. S-U grades only.  
Doctoral research.

EARTH AND ATMOSPHERIC SCIENCES

T. E. Jordan, chair; S. J. Colucci, co-chair  
(CALS); directors of undergraduate studies:  
B. L. Isacks (Geological Sciences and Science of Earth Systems—AAS), S. J. Riha (Science of Earth Systems—CALS), M. W. Wysocki  
(Atmospheric Sciences); and  
R. W. Allmendinger, W. D. Allmon,  
M. Barazangi, W. Basset, J. M. Bird,  
A. L. Bloom, L. D. Brown, L. M. Cathles,  
J. L. Casne, K. H. Cook, A. T. DeGaetano,  
L. A. Derry, P. J. Gierasch, C. H. Greene,  
D. L. Hysell, D. E. Karig, R. W. Kay,  
S. Mahfuz, M. C. Kelley, W. W. Knapp,  
J. E. Oliver, A. J. Pershing, J. Phipps Morgan,  
M. Pritchard, F. H. T. Rhodes, D. L. Turcotte,  
W. M. White, D. S. Wilks

For complete course descriptions, see the Earth and Atmospheric Sciences listing in the  
College of Arts and Sciences or the College of  
Agriculture and Life Sciences section.

EAS 101 Introductory Geological Sciences  
Fall. 3 credits. Staff.

EAS 102 Evolution of the Earth and Life  
(also offered as BIO Q 170)  
Spring. 3 credits. J. L. Cisne.

EAS 103 SES Freshman Colloquium  
Fall. 1 credit. TBA.

EAS 107 How the Earth Works  
Fall. 1 credit. J. L. Cisne.

EAS 108 Earth in the News  
Summer. 3 credits. S. L. Losh.

EAS 109 Dinosaurs  
Fall. 1 credit. J. L. Cisne.

[ EAS 111 To Know the Earth  
Fall. 3 credits. Not offered 2004–2005. Staff ]

EAS 121 Introduction to MATLAB  
(also CIS 121)  
Fall, spring. 2 credits. Prerequisites: MATH 111, 191, or equivalent. D. Schwartz.

EAS 122 Earthquake!  
(also ENGR 122)  
Spring. 3 credits. L. D. Brown.  
This is a course in the Introduction to Engineering series. For description, see ENGR 122.

EAS 131 Basic Principles of Meteorology  
Fall. 3 credits. M. W. Wysocki.  
The one-credit laboratory for this course is  
EAS 133.

EAS 133 Basic Meteorology Lab  
Fall. 1 credit. Laboratory. Prerequisite: concurrent enrollment in EAS 131.  
M. W. Wysocki.

Laboratory course covering topics presented in EAS 131. This course is required for  
atmospheric science majors, but is optional for other students taking EAS 131.

EAS 150 Fortran Applications in Earth Science  
Spring. 2 credits. Prerequisite: CIS/EAS 121 or equivalent. LET only. A. J. Pershing.

EAS 154 The Sea: An Introduction to Oceanography  
(also BIOEE 154)  
Spring, summer. 3 credits. Lecture: Spring. C. H. Greene, W. M. White; summer:  
B. C. Monger. The optional one-credit laboratory for this course is EAS 155/  
BIOEE 155.

EAS 155 The Sea: An Introduction to Oceanography  
(also BIOEE 155)  
Spring. 1 credit. Laboratory. Prerequisite: Concurrent enrollment in EAS 154.  
C. H. Greene.

Laboratory course covering topics presented in EAS 154.

[EAS 200 Art, Archaeology, and Analysis  
(also ENGRD 201, MS&E 285)  
Spring. 3 credits. Not offered 2004–2005.]

EAS 201 Introduction to the Physics and Chemistry of the Earth  
(also ENGRD 201)  
Fall. 3 credits. Prerequisites: PHYS 112 or  
207. J. Phipps Morgan, L. Cathles.

EAS 203 Fundamental Principles of Earth Science  
Fall. 3 credits. Letter grade only.  
Prerequisite: modest science background advantageous. L. M. Cathles, J. Phipps  
Morgan.

EAS 210 Introduction to Field Methods in Geological Sciences  
Fall. 3 credits. Prerequisites: EAS 101 or  
201, or permission of instructor. 1 lecture,  
Saturday field trips. R. W. Allmendinger.

EAS 213 Marine and Coastal Geology  
Summer. 4 credits. Prerequisite:  
an introductory course in geology or ecology  
or permission of instructor. Staff.

EAS 222 Seminar—Hawaii’s Environment  
Fall. 1 credit. S-U grade only. A. Moore,  
L. Derry.

EAS 240 Field Study of the Earth System  
Spring. 5 credits. Prerequisites: one  
semester of calculus (MATH 191, 192, 193  
or MATH 111, 112) and two semesters of  
any of the following: PHYS 207/208  
or 112/213; CHEM 207/208; BIOG  
101/103–102/104 or 105/106 or 109/110;  
or equivalent course work. Limited to  
those enrolled in Cornell Abroad Earth  
and Environmental Sciences Semester in  

EAS 250 Meteorological Observations and Instruments  
Fall. 3 credits. Prerequisite: EAS 131.  
M. W. Wysocki.
EAS 268 Climate and Global Warming
Spring. 3 credits. Prerequisite: basic college math. A. T. DeGaetano.

EAS 296 Forecast Competition
Fall and spring. 1 credit. S-U grades only. Prerequisite: sophomore undergraduate standing in atmospheric science, or permission of instructor. D. S. Wilks.

EAS 302 Evolution of the Earth System
Spring. 4 credits. Prerequisites: MATH 112 or 192 and CHEM 207 or equivalent. W. M. White, W. D. Allmon, B. L. Isacks.

EAS 315 Geomorphology
Fall. 4 credits. Prerequisite: one course in geology, hydrology, or soil science. B. L. Isacks.

EAS 321 Introduction to Biogeochemistry (also NTRES 321)
Fall. 4 credits. Prerequisites: CHEM 207, MATH 112, plus a course in biology and/or geology. L. A. Derry, J. Yavitt.

EAS 322 Biogeochemistry of the Hawaiian Islands
Spring. 4 credits. Prerequisite: BIOEE 261, EAS 321, EAS 455, or permission of instructor. Limited to those enrolled in Cornell Abroad and Earth and Environmental Sciences Semester in Hawaii. L. Derry.

EAS 326 Structural Geology
Spring. 4 credits. Prerequisite: one semester of calculus plus an introductory geology course or permission of instructor. One weekend field trip. R. W. Allmendinger.

EAS 331 Climate Dynamics (also ASTRO 331)
Fall. 4 credits. Prerequisite: two semesters of calculus and one semester of physics. K. H. Cook, P. J. Gierasch.

[EAS 334 Microclimatology
Spring. 3 credits. Prerequisite: a course in physics. Offered alternate years. D. S. Wilks.]

EAS 341 Atmospheric Thermodynamics and Hydrostatics
Fall. 3 credits. Prerequisites: 1 year of calculus and 1 semester of physics. A. T. DeGaetano.

EAS 342 Atmospheric Dynamics (also ASTRO 342)
Spring 3 credits. Prerequisites: 1 year each of calculus and physics. K. H. Cook and P. J. Gierasch.

[EAS 350 Dynamics of Marine Ecosystems (also BIOEE 350)
Fall. 3 credits. Prerequisites: 1 year of calculus and a semester of oceanography (i.e., EAS 154), or instructor's permission. C. H. Greene and R. W. Howarth.]

EAS 351 Marine Ecosystems Field Course (BIOEE 351)
Spring. 4 credits. Prerequisites: one semester of calculus (MATH 191, 192, 193 or MATH 111, 112), two semesters of biology (BIOG 101/103-102/104 or 105/106 or 109/110); one semester of oceanography (EAS 154) is recommended. Limited to those enrolled in Cornell Abroad and Earth and Environmental Sciences Semester in Hawaii. C. Greenc, B. Monger.

EAS 352 Synoptic Meteorology I
Spring. 3 credits. Prerequisites: EAS 341 and concurrent enrollment in EAS 342. M. W. Wysocki.

EAS 355 Mineralogy
Fall. 4 credits. Prerequisites: EAS 101 or 201 and CHEM 207/211 or permission of instructor. S. Mahlburg Kay.

EAS 356 Petrology and Geochemistry
Spring. 4 credits. Prerequisite: EAS 355. R. W. Kay.

EAS 375 Sedimentology and Stratigraphy
Fall. 4 credits. Prerequisite: EAS 101 or 201. J. L. Cove.

EAS 388 Geophysics and Geotectonics
Spring. 4 credits. Prerequisites: MATH 192 (or 112) and PHYS 208 or 213. B. L. Isacks.

EAS 401 Fundamentals of Energy and Mineral Resources
Spring. 3 credits. L. Cathles.

EAS 417 Field Mapping in Argentina
Summer. 3 credits. Prerequisites: EAS 210 and 326; Spanish desirable but not required. S. Mahlburg Kay.

EAS 434 Reflection Seismology
Fall. 3 credits. Prerequisites: MATH 192 and PHYS 208, 213, or equivalent. L. D. Brown.

EAS 435 Statistical Methods in Meteorology and Climatology
Fall. 3 credits. Prerequisite: an introductory course in statistics (e.g., EEM 210) and calculus. D. S. Wilks.

[EAS 437 Geophysical Field Methods
Fall. 3 credits. Prerequisite: PHYS 213 or 208 or permission of instructor. Offered alternate years. L. D. Brown.]

EAS 445 Introduction to Groundwater Hydrology (also EEE 471/CEE431)
Spring. 3 credits. Prerequisites: MATH 294 and ENGRD 202. L. Cathles.

EAS 447 Physical Meteorology
Fall. 3 credits. Prerequisites: 1 year each of calculus and physics. Offered alternate years. A. T. DeGaetano.

EAS 451 Synoptic Meteorology II
Fall. 3 credits. Prerequisites: EAS 341 and 342. S. J. Golucci.

[EAS 453 Advanced Petrology
Fall. 3 credits. Prerequisite: EAS 356. Offered alternate years. R. W. Kay.]

[EAS 454 Advanced Mineralogy
Spring. 3 credits. Prerequisite: EAS 355 or permission of instructor. Offered alternate years. Not offered 2004–2005. S. M. Kay.]

EAS 455 Geochemistry
Fall. 4 credits. Prerequisites: CHEM 207 and MATH 192 or equivalent. Recommended. EAS 356. Offered alternate years. W. M. White.

[EAS 456 Mosasaur Meteorology
Spring. 3 credits. Prerequisites: EAS 341 and 342 or permission of instructor. Offered alternate years. Not offered 2004–2005. S. J. Golucci.]

EAS 457 Atmospheric Air Pollution
Fall. 3 credits. Prerequisites: EAS 341 or 1 course in thermodynamics, and one semester of oceanography, or permission of instructor. Offered alternate years. M. W. Wysocki.

EAS 458 Volcanology
Fall. 3 credits. Prerequisite: EAS 356 or equivalent. Offered alternate years. R. W. Kay and W. M. White.

EAS 460 Late Quaternary Palaeoecology
Fall. 3 credits. Prerequisite: BIOEE 261. Offered alternate years. C. D. Harvell, C. H. Greene.

EAS 470 Weather Forecasting and Analysis
Spring. 3 credits. Prerequisites: EAS 352 and EAS 451. M. W. Wysocki.

EAS 475 Special Topics in Oceanography
Fall, spring. 2–6 var. credits. Prerequisites: one semester of oceanography and permission of instructor. Fall: spring. C. H. Greene, summer: B. C. Monger.

EAS 476 Sedimentary Basins: Tectonics and Mechanics
Fall. 3 credits. Prerequisite: EAS 375 or permission of instructor. Offered alternate years. T. E. Jordan.

[EAS 478 Advanced Stratigraphy
Fall. 3 credits. Prerequisite: EAS 375 or permission of instructor. Offered alternate years. Not offered 2004–2005. T. E. Jordan.]

[EAS 479 Palaeobiology (also BIOEE 479)
Fall. 4 credits. Prerequisites: 1 year of introductory biology and either BIOEE 274 or 373 or EAS 375, or permission of instructor. Offered alternate years. Not offered 2004–2005. W. Allmon.]

EAS 481 Senior Survey of Earth Systems

EAS 483 Environmental Biophysics
Spring. 3 credits. Offered alternate years. S. J. Riba.

EAS 487 Introduction to Radar and Remote Sensing (also ECE 487)
Fall. 3 credits. Prerequisites: PHYS 208 or 213 or equivalent or permission of instructor. D. L. Hysell.

EAS 491-492 Undergraduate Research
Fall, spring. 1–4 credits. Staff.

EAS 494 Special Topics in Atmospheric Science
Fall, spring. 8 credits maximum. S-U grades optional. Undergraduate level. Staff.

EAS 496 Internship Experience
Fall, spring. 1–2 credits. Staff.

EAS 497 Individual Study in Atmospheric Science
Fall, spring. 1–6 credits. S-U grades only. Students must register with an Independent Study form. Staff.

EAS 498 Teaching Experience in Earth and Atmospheric Sciences
Fall, spring. 1–4 credits. S-U grades only. Students must register with an Independent Study form. Staff.
EAS 499 Undergraduate Research in Atmospheric Science
Fall, spring. Credit by arrangement. S-U grades only. Students must register with an Independent Study form. L. M. Cathles.

EAS 500 Design Project in Geohydrology
Fall, spring. 5-12 credits. An alternative to an industrial project for M.Eng. students choosing the geohydrology option. May continue over two or more semesters. L. M. Cathles.

EAS 502 Case Histories in Groundwater Analysis
Spring. 4 credits. L. M. Cathles.

[EAS 622 Advanced Structural Geology I
Spring. 3 credits. Prerequisites: EAS 526 and permission of instructor. Offered alternate years. R. W. Allmendinger.]

EAS 624 Advanced Structural Geology II
Spring. 3 credits. Prerequisites: EAS 526 and permission of instructor. Offered alternate years. R. W. Allmendinger.

[EAS 628 Geology of Orogenic Belts
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 2004-2005. Staff.]

[EAS 634 Advanced Geophysics I
Fall. 3 credits. Prerequisite: EAS 388 or permission of instructor. Offered alternate years. Not offered 2004-2005.]

EAS 636 Advanced Geophysics II: Quantitative Geodynamics
Spring. 3 credits. Prerequisite: EAS 388 or permission of instructor. Offered alternate years. J. Phipps Morgan.

EAS 641 Analysis of Biogeochemical Systems
Spring. 3 credits. Prerequisite: MATH 293 or permission of instructor. Offered alternate years. L. A. Derry.

EAS 651 Atmospheric Physics (also ASTRO 651)
Fall. 3 credits. Prerequisite: a good background in undergraduate calculus and physics is required. Offered alternate years. K. H. Cook, P. J. Gierasch, S. J. Colucci.

EAS 652 Advanced Atmospheric Dynamics (also ASTRO 652)
Spring. 3 credits. Prerequisites: EAS 341 and 342 or their equivalent. Offered alternate years. S. J. Colucci, P. J. Gierasch.

EAS 656 Isotope Geochemistry
Spring. 3 credits. Open to undergraduates. Prerequisite: EAS 455 or permission of instructor. Offered alternate years. W. M. White.

EAS 666 Applied Multivariate Statistics
Spring. 3 credits. Prerequisites: multivariate calculus, matrix algebra, and two previous courses in statistics. Offered alternate years. D. S. Wilks.

[EAS 675 Modeling the Soil-Plant-Atmosphere System
Spring. 3 credits. Prerequisite: EAS/CSS 483 or equivalent. Offered alternate years. S. J. Riha.]

EAS 692 Special Topics in Atmospheric Science
Fall, spring. 1-6 credits. S-U grades optional. Staff.

EAS 695 Computer Methods in Geological Sciences
Fall, spring. 3 credits. L. Brown, B. L. Isacks.

EAS 700-799 Seminars and Special Work
Fall, spring. 1-3 credits. Prerequisite: permission of instructor. Staff.

EAS 711 Upper Atmospheric and Space Physics
D. L. Hyellw

EAS 722 Advanced Topics in Structural Geology
R. W. Allmendinger.

EAS 731 Planetary Geodynamics, Active Tectonics, Volcanology, Earthquakes, and Geodesy
M. Pritchard.

EAS 733 Advanced Topics in Geodynamics
Spring. J. Phipps Morgan.

EAS 751 Petrology and Geochemistry
R. W. Kay.

EAS 755 Geodynamics
Fall. 3 credits. J. Phipps Morgan.

EAS 757 Current Research in Petrology and Geochemistry
S. Mahlburg Kay.

EAS 762 Advanced Topics in Paleobiology
W. D. Allmon.

EAS 771 Advanced Topics in Sedimentology and Stratigraphy
T. E. Jordan.

EAS 773 Paleobiology
J. L. Case.

EAS 775 Advanced Topics in Oceanography
Spring. C. H. Greene.

EAS 777 Advanced Topics in Climate Dynamics
Spring. K. Cook.

EAS 780 Earthquake Record Reading
Fall. M. Barazangi.

EAS 781 Geophysics, Exploration Seismology, Ground-Penetrating Radar
L. D. Brown.

EAS 783 Advanced Topics in Geophysics
B. L. Isacks.

EAS 789 Lithospheric Seismology
L. D. Brown.

EAS 793 Andes-Himalaya Seminar

EAS 795 Low Temperature Geochemistry
1-3 credits. S-U grades only. L. A. Derry.

EAS 796 Geochemistry of the Solid Earth
W. M. White.

EAS 797 Fluid-Rock Interactions
L. M. Cathles.

EAS 799 Soil, Water, and Geology Seminar
Spring. L. M. Cathles, T. S. Steenhus.

EAS 850 Master's-Level Thesis Research in Atmospheric Science
Fall, spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty.

EAS 950 Graduate-Level Dissertation Research in Atmospheric Science
Fall, spring. Credit by arrangement. S-U grades optional. Hours by arrangement. Graduate faculty.

EAS 951 Doctoral-Level Dissertation Research in Atmospheric Science
Fall, spring. Credit by arrangement. S-U grades optional. Hours by arrangement. Graduate faculty.

ELECTRICAL AND COMPUTER ENGINEERING

C. R. Pollock, director; C. E. Seyler, associate director; D. H. Albonesi, A. B. Apsel.


ECE 210 Introduction to Circuits for Electrical and Computer Engineers (also ENGRG 210)
Fall, spring. 3 or 4 credits. Corequisites: MATH 293 and PHYS 213. ECE majors must take 4 credits, includes a design project. Non-ECE majors can take 3 credits. All students must take a lab and a section. Fall, J. C. Bellina, C. E. Seyler, spring, staff. For description, see ENGRG 210.

ECE 220 Signals and Information
Fall, spring. 3 or 4 credits. Prerequisite: MATH 293. ECE majors must take 4 credits. Fall, S. S. Hemmani; spring, C. R. Johnson. An introductory course in signal processing. Topics include frequency-based representations: Fourier series and discrete Fourier transform; discrete time linear systems: input/output relationships, filtering, spectral response; analog-to-digital and digital-to-analog conversion; continuous time signals and linear time invariant systems: frequency response and continuous-time Fourier transform.

[ENGRG 250 Technology in Society (also ENGRG 250, HIST 250 and S&T 250)]
Fall. 3 credits. A humanities elective for engineering students. Not offered 2004-2005. For description, see ENGRG 250.

ECE 291-292 Sophomore Electrical and Computer Engineering Project
Fall, spring, 291: 292. 1-4 credits. Limited to sophomores in Engineering. Staff. Individual study, analysis, and, usually, experimental tests in connection with a special engineering problem chosen by the student after consultation with the faculty member directing the project. An engineering report on the project is required. Students must make individual arrangements with a faculty sponsor.
prior to registration and submit a request for Independent Project form to the Electrical and Computer Engineering Undergraduate Office.

ECE 298 Inventing an Information Society (also AM ST 292, ENGRG 298, HIST 292, and S&S TS 292)
Spring. 3 credits. Approved for humanities distribution. R. R. Kline.
For description, see ENGRG 298.

ECE 303 Electromagnetic Fields and Waves
Fall. 4 credits. Prerequisites: grades of C or better in PHYS 213, 214, and MATH 294.
D. T. Farley.
Maxwell's equations in differential form; wave equation, plane electromagnetic waves; phase and group velocities; Poynting's theorem, complex dielectric constant; wave transmission and reflection, guided waves on transmission lines, transient pulse propagation; and elementary dipole antenna; analysis of wireless communication links.

ECE 306 Fundamentals of Quantum and Solid-State Electronics
Spring. 4 credits. Prerequisites: PHYS 214 and MATH 294. C. L. Tang.
Introductory quantum mechanics and solid-state physics necessary for modern solid-state electronic devices. Topics include the formalism and methods of quantum mechanics, the hydrogen atom, the structure of simple solids, energy bands, Fermi-Dirac statistics, and the basic physics of semiconductors. Applications include quantum wells and the p-n junction.

ECE 310 Introduction to Probability and Random Signals
Spring. 4 credits. Prerequisite: MATH 294.
This course may be used in place of ENGRD 270 to help satisfy the engineering distribution requirement. T. I. Fine.
Introduction to the theory of 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. Topics are given in such areas as communications, and device modeling, probability, and characteristic functions: nonlinear transformations of data; expectation and correlation; and the central limit theorem.

ECE 311 Electrical and Computer Engineering Honors Seminar
Spring. 1 or 2 credits. Staff.
Students registered for this course are required to attend all of the colloquium lectures. Summary papers are required. Honors students who take the seminar for letter grade are required to write two summary papers for two credits. Non-honors students, who must take the seminar pass/fail, are required to write one summary paper for one credit. Each summary paper reviews a topic presented during the term.

ECE 314 Computer Organization (also COM S 314)
Fall, spring. 4 credits. Prerequisites: COM S/ENG RD 211 or ENGRD 230 required. Fall, COM S staff; spring, staff.
Course description for spring offering: basic computer organization. Topics include performance metrics, data formats, instruction sets, addressing modes, computer arithmetic, microcoded and pipelined datapath design, memory hierarchies, including caches and virtual memory, I/O devices, bus-based I/O systems. Students learn assembly language programming and design a simple pipelined processor. For fall description, see COM S 314.

ECE 315 Introduction to Microelectronics
Fall, spring. 4 credits. Prerequisites: ECE/ENGRD 211.
Design of digital and analog electronic circuits in the context of modern integrated circuit technology. Course coverage includes the building blocks of integrated circuits: introductory physics of semiconductors, MOS and junction transistors; digital electronics—inverters, logic circuits, and memory; and analog circuits—multi-stage and differential amplifiers.

ECE 320 Networks and Systems
Spring. 4 credits. Prerequisites: ECE 220 and MATH 294. S. B. Wicker.
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 336 Nanofabrication (also ECE 536 and MS&E 541)
Spring. 3-5 credits. Prerequisites: PHYS 213 or 217, PHYS 214 or 218, CHIM 211 or 212, or equivalent. D. Ast.
For description, see MS&E 541.

ECE 391-392 Junior Electrical and Computer Engineering Project
Fall, spring. 391, 1-8 credits. Limited to juniors in Engineering.
Individual study, analysis, and, usually, experimental test in connection with a special engineering problem chosen by the student after consultation with the faculty member directing the project. An engineering report on the project is required. Students must make individual arrangements with a faculty sponsor prior to registration and submit a Request for Independent Project form to the Electrical Engineering Undergraduate Office.

ECE 402 Biomedical System Design (also BMPE 404)
Spring. 1-4 credits. Co- or prerequisites: at least one of ECE 425, ECE 476, ECE 453.
J. C. Belanger.
Course 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 6 or 7 weeks devoted to designing/prootyping a safe and effective "ambulatory microprocessor-controlled blood pressure monitor." Formal design document is required. ECE 402 is a culminating design experience (CDE) course.

ECE 411 Random Signals in Communications and Signal Processing
Fall. 3 credits. Prerequisite: ECE 310 or equivalent. A. Scaglione.
Introduction to models for random signals in discrete and continuous time; Markov chains, Poisson process, queuing processes, power spectral densities, Gaussian random process. Response of linear systems to random signals. Elements of estimation and inference as they arise in communications and digital signal processing systems.

ECE 413 Introduction to Nuclear Science and Engineering
Fall. 3 credits. Prerequisites: PHYS 214 and MATH 294. K. B. Cady.
This course is designed for juniors or seniors from any engineering field who want to prepare for graduate-level nuclear science and engineering courses at Cornell or elsewhere. It also can serve as a basic course for those who do not intend to continue in the field. It is an introduction to the fundamentals of nuclear reactors. Topics include an overview of the field of nuclear engineering; nuclear structure, radioactivity, and reactions; interaction of radiation and matter; and neutron moderation, neutron diffusion, the steady-state chain reaction, and reactor kinetics.

ECE 415 GPS: Theory and Design (also MASE 415)
Fall. 4 credits. Prerequisite: a 300-level engineering course with advanced math content such as ECE 303, or MAE 326.
A. M. Kranker.
An 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 415 is a culminating design experience (CDE) course.

ECE 425 Digital Signal Processing
Fall. 4 credits. Prerequisites: ECE 220, ECE 320, and ECE 310. T. W. Parks,
B. A. Hutchins.
An advanced course in digital signal processing. Topics include sampling, A/D and D/A conversion, digital filter design and implementation, multirate DSP including sampling rate conversion and filter bank theory, Wiener filtering, spectral estimation, introduction to two-dimensional sampling, and Fourier techniques.

ECE 426 Applications of Signal Processing
Spring. 4 credits. Prerequisite: ECE 425.
B. A. Hutchins.
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 426 is a culminating design experience (CDE) course.

ECE 430 Lasers and Optical Electronics
Fall. 4 credits. Prerequisite: ECE 303 or equivalent. C. R. Pollock.
An introduction to the operation and application of lasers. Material covered includes diffraction-limited optics, Gaussian beams, optical resonators, interaction of radiation with matter, physics of laser operation, and laser design. Applications of coherent radiation to nonlinear optics, co-localization, and research are discussed.

ECE 432 MicroElectro Mechanical Systems (MEMS)
Spring. 3 credits. Prerequisite: ECE 315 or permission of instructor A. Lal.
Introductory course to MEMS: microsensors, microactuators, and microsystems. Fundamentals of MEMS, including materials, microstructures, devices and simple microelectro-mechanical systems, scaling electronic and mechanical
systems to the micrometer/nm-scale, material issues, and the integration of micromechanical structures and actuators with simple electronics. This is an interdisciplinary course drawing content from mechanics, materials, structures, electronic systems, and the disciplines of physics and mathematics. ECE 452 is a culminating design course (CDE).

**ECE 433 Introduction to Microwave Devices and Circuits**

Fall, 4 credits. Prerequisites: ECE 305 and ECE 306. J. R. Shealy.

An introduction to the properties of microwave devices and circuits and the consideration of microwave devices and microwave measurement techniques. S-parameters, signal flow diagrams, matching networks, basic circuit design considerations, and computer-aided device and circuit analysis. Laboratories cover basic measurement techniques for active and passive elements as well as low noise amplifier design.

**ECE 437 Fiber and Integrated Optics**

Spring, 4 credits with a project. Prerequisite: ECE 305 or equivalent. M. Lipson.

Physical principles of optical waveguides. Wave equation solutions to the mode structure in waveguides, numerical analysis, mode coupling, dispersion and bandwidth limitations, optical materials, photonic band gap structures. Project design of planar optical components. ECE 477 is a culminating design experience (CDE) course.

**ECE 445 Computer Networks and Telecommunications**

Fall, 4 credits. Prerequisite: ECE or COM S 314 and a course in probability. Not offered 2004–2005.

This is a basic course in networking covering the design, analysis, and implementation of communication networks and systems. Topics covered include data transmission and data encoding, data link control, circuit vs. packet switching, Asynchronous Transfer Mode, local area networks, networking technology, network interconnections, protocol design (OSF and IP), network security, and multimedia. Emphasis is placed on performance evaluation.

**ECE 446 Digital Communications Over Packet-Switched Networks**

Spring, 4 credits. Prerequisites: ECE or COM S 314 and a course in probability. This is a basic course in networking covering the design and performance analysis of communication systems operating over packet-switched networks. It aims to bridge the gap between a classical networking class and a classical digital communications class.

The course is lab oriented, with a strong emphasis on programming assignments (both C and MATLAB). Topics covered include data compression, error control in networks, and network algorithms. ECE 446 is a culminating design experience (CDE) course.

**ECE 451 Electric Power Systems I**

Fall, 3 credits. Prerequisite: ECE 320 or equivalent. H. Chiang.

The objective is to acquaint the student with modern electrical system analysis and control. Analysis techniques appropriate for the restructured industry and advanced protection and control systems are stressed. Topics include transmission line models, transformers and per unit system, generator models, network matrices, power flow, system protection, computer relaying, and GPS-based measurement and control systems.

**ECE 452 Electric Power Systems II**

Spring, 3 credits. Prerequisite: ECE 451 or permission of instructor. R. J. Thomas.

Acquaints students with modern electric power system operation and control. Aspects of the restructuring of the industry and its implications for planning and operation objectives and their integration. 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 453 Analog Integrated Circuit Design**

Fall, 4 credits. Prerequisite: ECE 315 or equivalent. ECE 457 recommended as a corequisite. A. B. Apsel.

Overview of devices available to analog integrated-circuit designers in modern CMOS and BiCMOS processes: resistors, capacitors, MOS transistors, and bipolar transistors. Basic building blocks for linear analog integrated circuits: single-stage amplifiers, current mirrors, and differential pairs. Transistor-level design of linear analog integrated circuits such as operational amplifiers and operational transconductance amplifiers. Layout techniques for analog integrated circuits. Throughout the course, emphasis is placed on design-oriented analysis techniques. ECE 453 is a culminating design experience (CDE) course.

**ECE 457 Silicon Device Fundamentals**

Fall, 4 credits. Prerequisites: ECE 315 and ECE 306 or MEE 262 or AE 450. S. Tiwari.

Semiconductor carrier statistics, band diagrams, transport and their applications in device modeling. Emphasis is placed on the CMOS operations for advanced VLSI technology. Six labs cover device measurements and design by simulation. By using the combined simulation and measurement, the course leads to a comprehensive design project dealing with technical concerns in current VLSI industry as well as its economical, environmental, and social impacts. ECE 457 is a culminating design experience (CDE) course.

**ECE 467 Digital Communication Receiver Design**

Fall, 4 credits. Prerequisite: ECE 220. C. R. Johnson.

An introduction to broadband digital receiver design. Topics include PAM and QAM demodulation, pulse-shaping, matched filtering, carrier frequency and phase recovery, baud-timing synchronization, packet marker synchronization, adaptive linear equalization, and coding. Course project: composition and testing of a Matlab-based software receiver. ECE 467 is a culminating design experience (CDE) course.

**ECE 476 Digital Systems Design Using Microcontrollers**

Spring, 4 credits. Prerequisites: ENGRD 230 and ECE or COM S 314. J. F. Martinez.

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 hierarchy. Students learn the issues and tradeoffs involved in the design of modern microprocessors. Labs: Symbolic simulation of a processor and cache subsystem at the RTL level. ECE 476 is a culminating design experience (CDE) course.

**ECE 477 Computer Architecture**

Fall, 4 credits. Prerequisites: ENGRD 230 and ECE or COM S 314. J. F. Martinez.

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 hierarchy. Students learn the issues and tradeoffs involved in the design of modern microprocessors. Labs: Symbolic simulation of a processor and cache subsystem at the RTL level. ECE 476 is a culminating design experience (CDE) course.

**ECE 478 Digital VLSI Design**

Fall and spring, 5 credits (fall 4, spring 1). Prerequisites: ENGRD 230, ECE or COM S 314. Students will receive an R grade until they test their chips in the spring. K. T. Kornegay.

Introduction to digital VLSI design. Topics include basic transistor physics, switching networks and transistors, combinational and sequential logic, latches, clocking strategies, combo 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. Students take out a small project that is tested in the following semester. The course also includes an introduction to asynchronous design. ECE 474 is a culminating design experience (CDE) course.

**ECE 479 Computer Organization**

Fall and spring, 4 credits. Prerequisites: ENGRD 230 and ECE or COM S 314. J. F. Martinez.

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 hierarchy. Students learn the issues and tradeoffs involved in the design of modern microprocessors. Labs: Symbolic simulation of a processor and cache subsystem at the RTL level. ECE 476 is a culminating design experience (CDE) course.

**ECE 480 Fundamental of Digital Communications**

Topics include: digital source coding, Huffman coding, sampling, quantization, analog source coding; optimum receivers for digital transmission through additive white Gaussian noise (AWGN) channels, matched filters; channel capacity and error control coding; digital transmission through bandlimited AWGN channels, interference, clock offset (IS), equalization techniques, phase-locked loops (PLL: trellis-coded modulation (TCM), and spread-spectrum communication systems.

**ECE 472 Feedback Control Systems (also CHEM E 472 and M & A E 478)**

Fall, spring, 4 credits. Prerequisite: CHEM E 472, 480. B. R. Land.

For description, see M & A E 478.

**ECE 473 Optimizing Compilers**

Fall, 4 credits. Prerequisite: ECE/COM S 314. B. P. Buntscher.

This course provides in-depth coverage of how compilers optimize code for high-performance microprocessors as well as how software interacts with hardware and the operating system. The projects involve implementing, testing, and evaluating an optimizing compiler backend that generates executables for a UNIX workstation. Lecture topics include static single assignment form (SSA), redundancy elimination, loop optimizations, procedure optimizations, register allocation, instruction scheduling, control flow optimizations, numerous small optimizations, feedback optimization, executeable formats, and system calls.

**ECE 474 Digital VLSI Design**

Fall and spring, 5 credits (fall 4, spring 1). Prerequisites: ENGRD 230, ECE or COM S 314. Students will receive an R grade until they test their chips in the spring. K. T. Kornegay.

Introduction to digital VLSI design. Topics include basic transistor physics, switching networks and transistors, combinational and sequential logic, latches, clocking strategies, combo 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. Students take out a small project that is tested in the following semester. The course also includes an introduction to asynchronous design. ECE 474 is a culminating design experience (CDE) course.

**ECE 475 Computer Architecture**

Fall, 4 credits. Prerequisites: ENGRD 230 and ECE or COM S 314. J. F. Martinez.

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 hierarchy. Students learn the issues and tradeoffs involved in the design of modern microprocessors. Labs: Symbolic simulation of a processor and cache subsystem at the RTL level. ECE 476 is a culminating design experience (CDE) course.

**ECE 476 Digital Systems Design Using Microcontrollers**

Spring, 4 credits. Prerequisite: ECE/COM S 314. J. F. Martinez.

Design of real-time digital systems using microprocessor-based embedded controllers.
Students working in pairs design, debug, and construct several small systems that illustrate and employ the techniques of digital system design acquired in previous courses. The content focuses on the laboratory work. The lectures are used primarily for the introduction of examples, description of specific modules to be designed, and instruction in the hardware and high-level design tools to be employed. ECE 476 is a culminating design experience (CDE) course.

ECE 484 Introduction to Controlled Fusion: Principles and Technology (also M&AE 459 and NS&E 484)
Spring. 3 credits. Prerequisites: PHYS 112, 213, and 214, or equivalent background in electricity and magnetism and mechanics. Intended for seniors and graduate students in engineering and the physical sciences. Offered alternate years. D. A. Hamner. For description, see NS&E 484.

ECE 486 Electromagnetic Waves and Communication
Spring. 3-5 credits. Prerequisite: ECE 303. D. L. Hyssel.
This course is recommended for students who wish to obtain a greater understanding of the fundamentals of guided waves, high data rate electromagnetic wireless communication. Topics covered include vector and scalar potentials, transmission lines, waveguides, fiber optics, antenna arrays, and propagation in different environments including interference and diffraction.

ECE 487 Introduction to Radar and Remote Sensing
Fall. 3 credits. Prerequisites: ECE 220 and ECE 486 (or a grade of B or better in ECE 303). D. L. Hyssel.
Fundamentals of antenna theory, including gain and effective area, near and far fields, phased arrays, and aperture antennas and aperture synthesis. Fundamentals of radar, including detection, tracking, Doppler shifts, sampling, and range and frequency aliasing. Synthetic aperture radars and remote sensors from aircraft and satellites; over-the-horizon (OTH) radars and ionospheric propagation effects; and radar astronomy techniques.

ECE 488 RF Circuits and Systems
Spring. 4 credits. Prerequisites: ECE 315 or equivalent. 2 design credits. Lab credit. W. E. Schwartz.
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. Five laboratory sessions. ECE 488 is a culminating design experience (CDE) course.

ECE 491-492 Senior Electrical and Computer Engineering Project
Fall. 491: spring. 492: 1-8 credits. Limited to seniors in Engineering. Individual study, analysis, and, usually, experimental tests in connection with a special engineering problem chosen by the student after consultation with the faculty member directing the project. An engineering report documenting the project is required. Students must make individual arrangements with a faculty sponsor prior to registration for this course and submit a request for an independent project form to the Electrical Engineering undergraduate office.

ECE 493 Introduction to Evolutionary Computation
Fall. 3 credits. Prerequisite: a course in probability. J. D. Delchamps.
An introductory course that attempts to address the development of the field and culminates in discussion of current research topics. Specific choices of subject matter and focus will reflect the instructor's interests and will probably include evolutionary game theory and its relationship to learning.

ECE 495 Optimizing Compilers
This course provides in-depth coverage of modern compiler optimizations for high-performance microprocessors. Topics include static single assignment form (SSA), redundancy elimination, loop optimizations, procedure optimizations, register allocation, instruction scheduling, control-flow optimizations, interprocedural analysis and optimization, numerous "small" optimizations, and feedback optimizations. The projects involve implementing, testing, and evaluating a number of advanced compiler optimizations for a high-end microprocessor.

ECE 496 Principles of Large Scale, Computer Implemented Networks
Spring. 4 credits. Prerequisites: ECE requirements through the 200 level, plus some knowledge of probability. Recommended for junior and senior ECE students interested in the systems area. T. L. Fine.
Large-scale complex adaptive (LSA) networks in ECE include the Internet, World Wide Web; bulk electric power distribution systems; wireless and photonic communications networks. We study several principles common to LSA networks. Each principle will be introduced in the context of a particular large-scale complex adaptive network, abstracted to expose its mathematical essentials, and then illustrated and developed through calculations and/or simulations.

ECE 497 Practicum in Analog-Integrated Circuit Design
A practicum accompanying ECE 493. During the fall semester, students work in small groups designing an analog-integrated circuit that is sent out for fabrication through MOSIS. When the chips return from fabrication in the spring, students test their designs for functionality and performance.

ECE 512 Applied Systems Engineering I (also CEE 504, COM S 504, M&AE 591, OR&IE 512, SYSEN 510)
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 a strong system design component that is approved by a course instructor. A. W. Georgiadis, R. E. Boundy. For description, see M&AE 591.

ECE 513 Applied Systems Engineering II (also CEE 505, COM S 505, M&AE 592, OR&IE 513, SYSEN 520)
Spring. 3 credits. Prerequisite: Applied Systems Engineering I (CEE 504, COM S 504, ECE 512, M&AE 591, or OR&IE 512). Staff.
For description, see M&AE 592.

ECE 521 Theory of Linear Systems (also M&AE 521)
Fall. 3 credits. Prerequisite: ECE 320 or permission of instructor. Recommended: a good background in linear algebra and linear differential equations. M. L. Piskai. State-space and multi-input-multi-output linear systems in discrete and continuous time. The state transition matrix, the matrix exponential, and the Cayley-Hamilton theorem. Controllability, observability, stability, realization theory. At the level of Linear Systems by T. Kailath.

ECE 526 Signal Representation and Modelling
Spring. 4 credits. Prerequisites: ECE 425, T. W. Parks.
Sampling and signal reconstruction. Approximation theory. Linear inversion theory. Exponential signal modelling. Multirate filter banks, wavelets, and lifting. Laboratory experiments with speech and image signals.

ECE 531 Applied Quantum Optics for Photonics and Optoelectronics
Fall. 4 credits. Prerequisites: ECE 306 and 407, or PHYS 443. F. Rana.
Introduces the basic concepts of quantum optics and quantum electronics necessary for understanding the basic physical principles in photonic and optoelectronic devices and systems. Topics include quantization of the electromagnetic field, quantum mechanical properties of photon states, vacuum fluctuations, noise and quantum Langevin equations, matter-photon interactions, phase-sensitive and phase-insensitive optical amplifiers, direct and coherent photon detection, lasers, parametric oscillators, and photonic devices for quantum information processing.

ECE 535 Semiconductor Physics
Fall. 4 credits. Prerequisites: ECE 407 and 457, or permission of instructor. Not offered 2004-2005. S. Tiwari.
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. On the level of Compound Semiconductor Device Physics by S. Tiwari.

ECE 536 Nanofabrication for MENG (also ECE 336 and M&AE 541)
Spring. 3 credits. Prerequisites: PHYS 213 or 217, PHYS 214 or 218, CHEM 211 or 207, or equivalent. D. Ast.
For description, see MSE 541.

ECE 547 Computer Vision
Fall. 4 credits. Prerequisites: ECE 220 (or COM S 280 and 314) or consent of instructor. Not offered 2004-2005.
Computer acquisition and analysis of image data with emphasis on techniques for robot vision. This course 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.
will be considered in some detail, as will the iterative (turbo) decoding of concatenated codes and codes on graphs. The use of error control codes and channels will be discussed throughout the course.

**ECE 562 Fundamental Information Theory**

Spring. 4 credits. Prerequisite: ECE 411 or equivalent. T. Berger

Fundamental results of information theory with application to storage, compression, and transmission of data. Entropy and other information measures. Block and variable-length codes. Channel capacity and rate-distortion functions. Coding theorems and converses for classical and multiterminal configurations. Gaussian sources and channels.

**ECE 563 Communication Networks**

Fall. 4 credits. Prerequisite: ECE 411 or permission of instructor. T. Berger


**ECE 564 Detection and Estimation**

Spring. 4 credits. Prerequisites: ECE 410, ECE 475, or instructor's consent. L. Tong


**ECE 566 Wireless Networks**

Fall. 4 credits. Prerequisites: ECE 445 and ECE 441. Z. Haas

An introductory course in mobile and wireless networks. The course is targeted mainly at the graduate level but is open to undergraduates as well. The course covers fundamental techniques and protocols in the design and operation of the first, second, and third generation of wireless networks. Examples of related topics include cellular systems, medium access control, control of a mobile session and a mobile call, signaling in mobile networks, mobility management techniques, common air interfaces (AMPS, IS-136, IS-95, GSM), wireless data (CDPD, Mobitex), satellite communication, ad hoc networks (Bluetooth), Internet Mobility, Personal Communication Services (PCS), and so on.

**ECE 567 Digital Communications**

Fall. 4 credits. Prerequisites: ECE 310, ECE 411, or instructor's consent. L. Tong

A graduate-level introduction to fundamentals of digital communications. Complex random signals. Digital modulations and optimal receiver principles. Baseband and passband transmissions and processing. Interference channels and equalization techniques. Performance analysis including error rate calculation and bounds, cutoff rate and channel capacity. Applications in wireless and digital subscriber loops (DSL).

**ECE 568 Mobile Communication Systems**

Spring. 4 credits. Prerequisites: ECE 411 and ECE 467; corequisite: ECE 468. Scaglione

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 572 Parallel Computer Architecture**

(Also COM S 516)

Spring. 4 credits. Prerequisite/corequisite: ECE 475, J. F. Martinez

Principles and tradeoffs in the design of parallel architectures. For description, see ECE 574.

**ECE 573 Advanced Digital VLSI Design**

Fall. 4 credits. Prerequisites: ECE 474, ECE 475, R. Manohar

Top-down approach to asynchronous design and the relation between computer architecture and VLSI design. For the asynchronous design component: high-level synthesis, design by program transformations, and correctness by construction. Topics include delay-insensitive design techniques, description of circuits as concurrent programs, program compilation, and electrical optimizations. Students complete a group project of the design of a processor or microprocessor. The processor can be clocked, asynchronous, or a combination of the two. Note: the only difference between taking and not taking ECE 576 is fabricating and testing the chip. All students have to design one.

**ECE 575 High-Performance Processor Architecture**

Spring. 3 credits. Prerequisite: ECE 475. M. Burtscher.

This course provides in-depth coverage of the advanced architectural features of current and next-generation high-performance microprocessors. Topics include superscalar design, out-of-order execution, register renaming, caching, value prediction, confidence estimation, branch prediction, predication, control speculation, multithreading, compiler optimizations, and case studies of existing processors. Projects involve writing simulators to evaluate the performance of various microprocessor components.

**ECE 576 Advanced Digital VLSI Design Project**

Course starts in spring term and finishes the following fall (2-semester course).

5 credits. Prerequisites: ECE 474, ECE 475. Groups receive an R in ECE 576, for the spring, until they fabricate and test their chips the following fall. Not offered spring and fall 2005.

For description, see ECE 574.

**ECE 579 Radio Frequency (RF) Integrated Circuit Design**

Fall and spring. 6 credits. Prerequisites: ECE 433, ECE 453, and ECE 488. Not offered 2004–2005.
This two semester, 6-credit course conveys practical knowledge of advanced concepts related to the design radio-frequency (RF) integrated circuits, signal processing, and control. Emphasis is on the circuit architecture, design, trade-offs, optimization, and layout of RF integrated circuits for use in wireless applications. Special attention is devoted to the most important challenges facing RF circuit designers today, such as the impact of noise, power distribution, and consumption. Low noise amplifiers, voltage-controlled oscillator (VCO), and high-performance operational amplifiers are emphasized.

The basic transmitter/receiver building blocks are covered, and students learn to design and assemble them to form single-chip wireless systems.

**ECE 581 Introduction to Plasma Physics (also A&EP 606)**

Fall. 4 credits. Prerequisite: ECE 303 or equivalent. First-year graduate-level course; open to exceptional seniors.

D. A. Hammer.

Topics covered include plasma state; motion of charged particles in fields; drift-orbit theory; collisionless transport; 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 585 Upper Atmospheric Physics I**

Fall. 4 credits. Prerequisite: Physics through 214 or equivalent, introductory chemistry, ECE 486 or equivalent. Not offered 2004–2005.

D. A. Hammer.


**ECE 586 Upper Atmospheric Physics II**

Spring. 4 credits. Prerequisites: ECE 581 and ECE 585. C. E. Seyler.

Topics include solar phenomena, solar wind, and space weather; magnetospheric structure and physical processes; plasma instabilities in the ionosphere and magnetosphere; and magnetic reconnection and the relation to high-latitude phenomena.

**ECE 587 Energy Seminar I (also NS&E 544 and M&A 545)**

Fall. 1 credit. D. A. Hammer.

Energy resources, their conversion to electricity, and the environmental consequences of the energy cycle are discussed by faculty members from several departments in the university and by outside experts. Examples of topics to be covered include: energy resources and economics; coal-based electricity generation; nuclear reactors; solar power; energy conservation by users; and air pollution control.

**ECE 588 Energy Seminar II (also M&A 546)**

Spring 1 credit. D. A. Hammer.

See description for ECE 587; however, there will be different speakers and/or topics discussed in ECE 588.
Emphasis is on developing tools needed to do research work in this area.

**[ECE 697 Topics in Computer Systems]**
Spring. 1 credit. S-U only. Prerequisites: ECE 475 and interest in computer systems. Not offered 2004–2005.
A course for systems graduate students in which the class reads papers about the design and implementation of computer systems and their components. Influential papers from the past as well as papers describing current research and development efforts are discussed.

**ECE 698 The Foundations of Probability**
Fall. 3 credits. Prerequisite: prior course in probability: T. L. Fine.
This course examines a variety of interpretations/meanings that have been proposed for probability, including logical/epistemic, subjective, frequentist, and propensity. It also examines a variety of mathematical formulations of probability in which probability is not just an assignment of real numbers to events. Examples include comparative probability, interval-valued probability, set-valued probability, and plausibility measures.

**ECE 791-792 Thesis Research**
Fall, 791; spring, 792. 1–15 credits. For students enrolled in the master's or doctoral program.

**INFORMATION SCIENCE, SYSTEMS, AND TECHNOLOGY**

- **INFO 130 Introductory Design and Programming for the Web (also COM S 130)**
  Fall. 3 credits.
- **INFO 214 Cognitive Psychology (also COGST 214, PSYCH 214)**
  Fall. 3 credits. Sophomore standing required. Limited to 175 students. Graduate students: see INFO 614, PSYCH 614, or COGST 501.
- **INFO 230 Intermediate Design and Programming for the Web (also COM S 230)**
  Spring. 3 credits. Prerequisite: COM S/ INFO 130 or equivalent.
- **INFO 245 Psychology and Social Computing (also COMM 245)**
  Fall. 3 credits.
- **INFO 292 Inventing an Information Society (also ECE 296, ENGRG 298, HIST 292, S&T 292)**
  Spring. 3 credits.
- **INFO 295 Mathematical Models for Information Science**
  Fall. 4 credits. Corequisite: MATH 231 or equivalent.
- **INFO 330 Applied Database Systems (also COM S 330)**
  Fall. 3 credits. Prerequisite: COM S 211/ENGRD 211.
- **INFO 345 Human-Computer Interaction Design (also COMM 345)**
  Spring. 3 credits.
- **INFO 349 Media Technologies (also S&T 349)**
  Spring. 3 credits.
- **INFO 355 Computers: From Babbage to Gates (also S&T 355)**
  Spring. 4 credits.
- **INFO 387 The Automatic Lifestyle: Consumer Culture and Technology (also S&T 387)**
  Spring. 4 credits. Not offered spring 2005.
- **INFO 430 Information Retrieval (also COM S 430)**
  Fall. 5 credits. Prerequisite: COM S 211/ENG RD 211 or equivalent.
- **INFO 431 Web Information Systems (also COM S 431)**
  Spring. 3 credits. Prerequisites: COM S 211 and some familiarity with the technology of web sites.
- **INFO 435 Seminar on Applications of Information Science (also INFO 635)**
  Spring. 3 credits. Prerequisites: background in computing, data structures, and programming at the level of COM S 211 or equivalent, and experience in using information systems.
- **INFO 440 Advanced Human-Computer Interaction Design (also COMM 440)**
  Fall. 3 credits.
- **INFO 447 Social and Economic Data (also ILR 447)**
  Spring. 4 credits. Prerequisites: one semester of calculus, the IS statistics requirement, at least one upper-level social science course, or permission of the instructor.
- **INFO 450 Language and Technology (also COMM 450)**
  Spring. 3 credits.
- **INFO 490 Independent Reading and Research**
  Fall, spring. 1–4 credits.
- **INFO 491 Teaching in Information Science, Systems, and Technology**
  Fall, spring. Variable credit.
- **INFO 515 Culture, Law, and Politics of the Internet**
  Fall. 4 credits.
- **INFO 530 The Architecture of Large-Scale Information Systems (also COM S 530)**
  Spring. 4 credits. Prerequisite: COM S/ INFO 330 or COM S 432.
- **INFO 614 Cognitive Psychology (also PSYCH 614)**
  Fall. 5 credits. S. Edelman.
  This course consists of two components: PSYCH 214 (3 credits) and COGST 501 (2 credits). It is intended for graduate students; undergraduates opting for 5 credits should enroll simultaneously in PSYCH 214 and COGST 501.
- **INFO 630 Representing and Accessing Digital Information (also COM S 630)**
  Fall. 4 credits. Prerequisite: COM S 472 or 478 or 578 or the equivalent.
- **INFO 634 Information Technology in Sociocultural Context (also S&T 634)**
  Fall. 4 credits. Prerequisite: permission of instructor.
- **INFO 635 Seminar on Applications of Information Science (also INFO 435)**
  Spring. 3 credits. Prerequisites: background in computing, data structures, and programming at the level of COM S 211 or equivalent, and experience in using information systems.
  Undergraduates and master's students should register for INFO 435. PhD students should register for INFO 635.
- **INFO 640 Human-Computer Interaction Design (also COMM 640)**
  Fall. 3 credits. Prerequisite: graduate standing or permission of instructor.
- **INFO 685 The Structure of Information Networks (also COM S 685)**
  Spring. 4 credits. Prerequisite: COM S 482.

**MATERIALS SCIENCE AND ENGINEERING**


**Undergraduate Courses**

- **MS&E 111 Nanotechnology (also ENGR 111)**
  Fall. 3 credits. E. Giannelis.
  This is a course in the Introduction to Engineering series. For description, see ENGR 111.
- **MS&E 118 Design Integration: A Portable CD Player (also ENGR 118 and T &AM 118)**
  Spring. 3 credits. W. Sachse.
  This is a course in the Introduction to Engineering series. For description, see ENGR 118.
- **MS&E 119 Biomaterials for the Skeletal Systems (also ENGR 119)**
  Fall. 3 credits. D. T. Grubb.
  This is a course in the Introduction to Engineering series. For description, see ENGR 119.
- **MS&E 124 Designing Materials for the Computer (also ENGR 124)**
  Spring. 3 credits. 3 lectures.
  This is a course in the Introduction to Engineering series. For description, see ENGR 124.
- **MS&E 204 Materials Chemistry**
  Spring. 4 credits. U. Wiesner.
  This course is designed to give a molecular understanding of materials properties with emphasis on general concepts. In the first part, the structure of atoms is discussed introducing fundamental concepts of quantum chemistry. In the second part the transition from atoms to molecules is made discussing symmetry aspects of chemical bonding.
The last part describes the transition from molecules to materials. Materials classes covered include modern examples of polymers, organic semiconductors, ceramics, organic-inorganic hybrids, and superconductors emphasizing the interdisciplinary nature of materials science. Examples illustrate current materials research involving nanobiotechnology, organic optoelectronics, self-assemblying materials, or nano-ceramic.

**MS&E 206 Atomic and Molecular Structure of Matter (also M&E 313)**
Spring. 4 credits. Staff.
The course discusses the basic elements of structure; order and disorder; ideal gas; crystals; liquids; amorphous materials; polymers; liquid crystals; composites; crystal structure; x-ray diffraction.

**MS&E 261 Mechanical Properties of Materials: From Nanodevices to Superstructures (also ENGRD 261)**
Fall. 3 credits. S. P. Baker.
For description, see ENGRD 261.

**MS&E 262 Electronic Materials for the Information Age (also ENGRD 262)**
Fall. 3 credits. Prerequisite: MATH 192, Corequisite: PHYS 213 or permission of instructor. G. Malliaris.
For description, see ENGRD 262.

**MS&E 291-292 Research Involvement Ia and Iib**
291, fall; 292, spring. 3 credits each term.
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-term affiliation with a research group.

**MS&E 302 Mechanical Properties of Materials, Processing, and Design (also M&E 323 and MSE 582)**
Spring. 4 credits. Prerequisite: MS&E 206. Corequisite: PHYS 214 or permission of instructor. S. P. Baker.

**MS&E 303 Thermodynamics of Condensed Systems**
Fall. 4 credits. Prerequisites: PHYS 214 and MATH 294. M. O. Thompson.
The three laws of thermodynamics are introduced as the fundamental basis for thermal and chemical equilibrium, coupled with statistical mechanical interpretations for entropy and specific heat capacities. These principles are applied to understanding phase equilibrium diagrams, heterogeneous reactions, solutions, surfaces, and defects. Introduction to electrochemistry and fuel/power cells.

**MS&E 304 Kinetics, Diffusion, and Phase Transformation (also MSE 584)**
Spring. 4 credits. Prerequisite: MS&E 303 or permission of instructor.
The topics covered 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; thermal 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 305 Electronic, Magnetic, and Dielectric Properties of Materials (also MSE 585)**
Fall. 4 credits. Prerequisite: MS&E 206 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, local origin of magnetic behavior, ferromagnetic domains, magneto-resistance. Materials for data storage and manipulation. Polarization in dielectric materials; frequency dependence of dielectric constants and refractive indexes. Ferroelectric domains. Dielectric components in devices. The close connection between fundamental concepts and current technology will be emphasized.

**MS&E 307 Materials Design Concept I**
Fall. 2 credits. S. Sass.
For description, see MSE 407.

**MS&E 311 Junior Laboratory I**
Fall. 1 credit. Staff.
Practical laboratory covering the analysis and characterization of materials and processing. The fall semester labs will be based on materials from courses in thermodynamics of condensed systems and electronic, magnetic, and dielectric properties of materials.

**MS&E 312 Junior Laboratory II**
Spring. 1 credit. Staff.
Practical laboratory covering the analysis and characterization of materials and processing. The spring semester labs will be based on course material in kinetics, diffusion, and phase transformation and mechanical properties of materials, processing, and design.

**MS&E 391-392 Research Involvement Ila and Ilib**
391, fall; 392, spring. 3 credits each term.
Prerequisite: approval of department. Staff.
For description, see MS&E 291. May be continuation or a 1-semester affiliation with a research group.

**MS&E 404 Materials Laboratory I and II**
403, fall; 404, spring. 2 credits. D. Grubb.
Practical laboratory covering the analysis and characterization of materials and processing. Emphasis is on design of experiments for evaluation of materials' properties and performance as related to processing history and microstructure. Projects available in areas such as plasticity, mechanical and chemical processing, phase transformations, electrical properties, magnetic properties, and electron microscopy.

**MS&E 405-406 Senior Thesis I and II**
405, fall; 406 spring. 4 credits each term. Staff.
Open to advanced undergraduates in lieu of the senior materials laboratory. Proposals for thesis topics should be approved by the supervising faculty member prior to 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. Both semesters must be taken to complete the laboratory requirement. This course is required for graduation with honors.

**MS&E 407 Materials Design Concepts II**
Fall. 2 credits. Staff.
The goal of this course is to introduce 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 will be studied in light of economic, environmental, regulatory, and safety issues. Patent searching and communication skills will be addressed. In the second portion of the course, speakers from industry lecture on case studies of materials design problems. Students give oral presentations and write technical reports based on the case studies.

**MS&E 433 Materials for Energy Production, Storage, and Conversion**
Fall. 3 credits. R. Dieckmann.
This new course is 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 will be the central part of this class.

**MS&E 461 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, much of the course is taken up with case studies where a physiological system is considered, then the design of artificial parts and the materials now chosen are investigated. Constraints such as methods of production, economics, regulatory approval, and legal liabilities are included in the case study. Examples may include dialysis, contact and intra-ocular lenses, heart valves, and the artificial pancreas. Every student is involved in a presentation to the class about a case study.

**MS&E 471 Transmission Electron Microscopy**
Fall. 1 credit. S. Sass.
This course covers the theory and practice of obtaining and interpreting TEM data from crystalline materials. Topics include microscope optics and conventional and high-resolution image formation. Special emphasis is placed on electron diffraction (formation and analysis of spot patterns, Kikuchi pattern, and convergent beam pattern) and obtaining useful images of crystal defects.
Practical requirements for high-resolution imaging of crystal lattices and interfaces are also covered. Associated theoretical topics include kinematical and dynamical diffraction theories, the contrast transfer function theory of phase contrast, and image modeling and image analysis for quantitative interpretation of data. Current text is *Transmission Electron Microscopy* by D. B. Williams and C. B. Carter.

**MS&E 481 Technology Management (also MS&E 597)**
Spring. 3 credits. E. P. Giannelis. This course is designed to provide students in engineering and the sciences with the knowledge and analytical skills to manage R&D for competitive advantage. Most organizations recognize the critical importance of R&D 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, R&D portfolio, intellectual property portfolio and management, technology transfer, and technology, policy, and society.

**MS&E 487 Ethics and Technology**
Fall. 1 credit. C. Ober. Ethics influences all decisions made by a technology-based organization. This course discusses those factors that must be considered in reaching a decision involving technology, ranging from legal impact to consideration of community expectations.

**MS&E 491-492 Research Involvement IVa and IVb**
491 Fall; 492, Spring. 3 credits each term. Prerequisite: approval of department. Staff. For description, see MS&E 291. May be continuation or a one-term affiliation with a research group.

**MS&E 495 Undergraduate Teaching Involvement**
Fall, spring. Variable credit. Staff. This course will give credit to students who help in the laboratory portions of select MS&E courses. The number of credits earned will be determined by the teaching load and will typically be 1-3 credits.

**MS&E 512 Mechanical Properties of Thin Films (also M&E 513)**
Spring. 3 credits. Offered alternate years. S. P. Baker.

**MS&E 521 Properties of Solid Polymers**

**MS&E 523 Physics of Soft Materials**
Fall. 3 credits. Offered alternate years. U. B. Wiesner. The course covers general aspects of structure, order, and dynamics of soft materials. Typical representatives of this class of materials are polymers, liquid crystals, gels, and surfactant solutions. A general formalism for the description of order in terms of orientation distribution functions is introduced. Examples are given for the measurement of order parameters for partially ordered materials. Finally, the dynamics of soft materials is discussed. Besides transport and flow behavior aspects of the local dynamics of soft materials are presented. Emphasis is put on the discussion of various techniques frequently used (and available at Cornell) for the characterization of structure, order and dynamics of soft materials such as NMR or various scattering techniques. Using examples of modern multidimensional spectroscopic methods the issue of heterogeneous dynamics at the glass transition of amorphous liquids is presented at the end of the class.

**MS&E 524 Materials Chemistry of Synthetic Polymeric Materials**
Fall. 3 credits. Prerequisite: MS&E 521 or permission of instructor. Offered alternate years.

**MS&E 525 Organic Optoelectronics**
Fall. 3 credits. Offered alternate years. G. G. Malliaras.

**MS&E 531 Introduction to Ceramics**
Spring. 3 credits. C. Laddell. This course covers ceramic processes and products, structure of ceramic crystals, structure of glasses, structural defects (point defects, dislocations), surfaces, interfaces and grain boundaries, diffusion in ionic materials (atomistic and phenomenological approach, relationships between diffusion and point defect structure), ceramic phase diagrams, phase transformations. Physico-chemical aspects of the different topics are emphasized.

**MS&E 541 Nanofabrication**
Spring. 3, 4, or 5 credits. D. Ast. The previous material science course in micromachining has been combined with ECE 336 and is taught jointly with ECE. The course consists of a 2-lecture, 3-credit core course providing an introduction to the materials and processes used to fabricate integrated circuits and micro electromechanical systems. An optional extension is a hands-on, 1-credit, laboratory in which students fabricate transistors, simple integrated circuits, and MEMS structures. Students enrolled in MS&E 541 must enroll in the advanced topic, 1-credit section of the course. Enrollment in the advance credit section is optional for students registered in ECE 336. The recommended textbook is *Micromachining and its Application in Microelectronics* by Campbell. Course notes available to registered students on a password-protected web site.

**MS&E 542 Materials Design in Electronic Packaging**

**MS&E 543 Thin-Film Material Science**
Fall. 3 credits. Offered alternate years. D. G. Ast. This course provides fundamental information on the deposition, properties, reaction, and evaluation of thin films. Topics covered include: deposition techniques, surface energies, stress in thin films, surface kinetics, homoepitaxy, heteroepitaxy and superlattices, electrical and optical properties, Schottky barriers, solid phase regrowth, interdiffusion, thin film reactions, and electromigration. The recommended textbook is *Thin Film Science for Electrical Engineers and Material Scientists* by Tu, Mayer, and Feldman.

**MS&E 544 Plasma Processing of Electronic Materials (also ECE 482)**
Spring. 3 credits. Prerequisite: PHYS 213 and 214 or equivalent. Offered on demand. Staff. For description, see ECE 482.

**MS&E 545 Magnetic and Ferroelectric Materials**
Fall. 3 credits. Prerequisites: PHYS 213 and 214 or equivalent. Offered alternate years. R. B. van Dover. This course covers the fundamentals of magnetic phenomena and specific magnetic materials and their use in modern applications. Magnetization phenomena, the origin of magnetism in a material, magnetic domains, and magnetic anisotropy are included in the fundamentals. Specific magnetic materials and their applications include ferromagnetism in thin films and fine particles, amorphous magnetic materials; magnetic recording, magnetic circuits.

**MS&E 546 Solar Cells: Energy from the Environment**
Fall. 2 or 3 credits.LEC, 2 credits. Lab, 1 credit. Laboratory enrollment is limited to 10 students. No prerequisites. Not offered fall 2004. D. G. Ast.

**MS&E 555 Introduction to Composite Materials (also MS&E 545 and T&M 456)**
Spring. 3 credits. For description, see T&M 456.

**MS&E 563 Nanobiotechnology (also A&EP 663 and BIO G 663)**
Spring. 3 credits. For description, see A&EP 663.

**MS&E 571 Analytical Techniques for Material Science (Also MS&E 603)**
Spring. 3 credits. Offered alternate years. Not offered spring 2005.

**MS&E 572 Computational Materials Science**
Spring. 3 credits. Prerequisite: MS&E 303/601 or equivalent; programming. Not offered spring 2005. M. O. Thompson.

**Graduate Professional Courses**

**MS&E 501-502 Special Project**
501. Fall; 502, Spring. 6 credits each term. Master of Engineering research project.

**MS&E 501**
Atomic and Molecular Structure of Matter (also MS&E 206 and M&E 313)
Spring. 4 credits. Staff. For description, see MS&E 206.

**MS&E 502**
Mechanical Properties of Materials, Processing, and Design (also MS&E 302 and M&E 323)
Spring. 4 credits. Corequisite: MS&E 594 or permission of instructor. For description, see MS&E 302.

**MS&E 583 Thermodynamics of Condensed Systems (also MS&E 303)**
Fall. 4 credits. M. O. Thompson. For description, see MS&E 303.

**MS&E 584 Kinetics, Diffusion, and Phase Transformation (also MS&E 304)**
Spring. 4 credits. Prerequisite: MS&E 583 or permission of instructor. For description, see MS&E 304.
Graduate Core Courses

**MS&E 601 Therodynamics of Materials**
Fall. 3 credits. Prerequisite: course in thermodynamics at level of MS&E 503.
Topics covered include basic statistical thermodynamics, partition functions and thermodynamic state functions, distributions, laws of thermodynamics, free-energy functions and conditions of equilibrium, chemical reactions, statistics of electrons in crystals, heat capacity, heterogeneous systems and phase transitions, and lattice models of 1-, 2-, and 3-dimensional interacting systems. Also covariant thermodynamics of alloys, free-energy and phase diagrams, order-disorder phenomena, point defects in crystals, and statistical thermodynamics of interfaces.

**MS&E 602 Elasticity, Plasticity, and Fracture**
Spring. 3 credits. Offered alternate years. Not offered spring 2005.

**MS&E 603 Analytical Techniques for Materials Science (also MS&E 571)**
Spring. 3 credits. Offered alternate years. Not offered spring 2005.
For description, see MS&E 571.

**MS&E 604 Kinetics of Reactions in Condensed Matter**
Spring. 3 credits. A. L. Ruoff.
Phenomenology and microscopic aspects of diffusion in fluids, both simple and polymeric, and in metallic, ionic, semiconductor, and polymeric solids. Cartesian tensors are utilized for fields and properties. Covers phase stability and transformations; nucleation and growth, spinodal decomposition and displacive transformations; phase coarsening processes, recrystallization, and grain growth; diffusion-controlled growth, interfacial reactions, moving boundary problems; grain-boundary diffusion controlled kinetics; viscosity, anelasticity, and diffusional creep. Texts: 1) Shewmon, Diffusion in Solids, 2) Porter and Easterling, Phase Transformations in Metals and Alloys.

Related Course in Another Department

**Introductory Solid-State Physics (PHYS 454)**

Further Graduate Courses

**MS&E 621 Advanced Inorganic Chemistry III: Solid-State Chemistry (also CHEM 607)**
Fall. 4 credits. Prerequisite: CHEM 605 or permission of instructor. S. Lee.
For description, see CHEM 607.

**MS&E 622 Synthetic Polymer Chemistry (also CHEM 675 and CHEM 671)**
Spring. 4 credits. Prerequisites: CHEM 359–360 or equivalent or permission of instructor. Staff.
For description, see CHEM 671.

**MS&E 631 Solid-State Reactions**
Fall. 3 credits. Offered alternate years. Not offered 2005-2006. R. Dieckmann.

**MS&E 632 Solid State Electrochemistry**
Fall. 3 credits. Prerequisite: MS&E 631 or permission of instructor. Not offered 2004-2005. R. Dieckmann.

**MS&E 655 Composite Materials (also M&AEE 665 and T&AM 655)**
Spring. 4 credits. Fall.
For description, see T&AM 655.

**MS&E 665 Principles of Tissue Engineering (also M&AEE 665, BMEP 665)**
Spring. 3 credits. Prerequisite: graduate standing or permission of instructor.
This course covers introductory concepts in tissue engineering, including: polymeric biomaterials used for scaffolds, mechanisms of cell-biomaterial interaction, biocompatibility and foreign body response, cell engineering, and tissue biomechanics. This knowledge is applied to engineering of several body systems, including the musculoskeletal system, cardiovascular tissues, nervous system, and artificial organs. These topics are discussed in the context of scale-up, manufacturing, and regulatory issues.

**MS&E 671 Principles of Diffraction (also A&EP 711)**
Spring. 3 credits. Letter grades only. J. D. Brock.
For description, see A&EP 711.

**MS&E 672 Transmission Electron Microscopy (also MS&E 471)**
Fall. 1 credit. Prerequisite: MS&E 206 or equivalent. Offered alternate years.

**MS&E 680 Research in Materials Science**
Fall. 3 credits. Offered alternate years. J. Blakely.
This course deals with special topics in the field of surface and interface science. Knowledge of basic statistical thermodynamics, crystallography, elementary quantum mechanics, and theory of rate processes is assumed. The following are the main topics: 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**

**MS&E 800 Research in Materials Science**
Fall. Spring. Credit to be arranged. Staff.
Independent research in materials science under the guidance of a member of the staff.

**MS&E 801 Materials Science and Engineering Colloquium**
Fall and spring. 1 credit each term. Credit limited to graduate 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.

**MS&E 802 Materials Science Research Seminars**
Fall, spring. 2 credits each term. For graduate students involved in research projects. Staff.
Short presentations on research in progress by students and staff.

General and Required Courses

**MAE 101 Naval Ship Systems (also NAV S 202)**
Spring. 3 credits.
For description, see NAV S 202.

**MAE 117 Introduction to Mechanical Engineering (also ENGRI 117)**
Fall. 3 credits. 2 lectures and 1 lab per week.
This is a course in the Introduction to Engineering series. For description, see ENGR 117.

**MAE 127 Introduction to Entrepreneurship and Enterprise Engineering (also ENGRI 127)**
Spring. 3 credits. Open to all Cornell students regardless of major. No prerequisites.
For description, see ENGR 127.

**MAE 212 Mechanical Properties and Selection of Engineering Materials.**
Spring. 3 credits. Prerequisite: ENGRD 202 (strictly enforced). Software fee.
This course covers the mechanics of deformable bodies and reinforces the concept of "simple engineering elements" for mechanical analysis associated with design. There is an 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 and on elasticity and combined loading effects. Failure criteria, including yielding, buckling, fracture, fatigue, and environmental effects, are developed. A general introduction to the function/constraints/objectives approach to material selection associated with the 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 221 Thermodynamics (also ENGRD 221)**
Fall, spring may be offered summer. 3 credits. Prerequisites: MATH 192 and PHYS 112 or permission of instructor.
For description, see ENGR 221.

**MAE 225 Mechanical Synthesis**
Spring. 4 credits. Prerequisite: ENGRD 202. Pre- or corequisites: ENGRD 203 and ENGRD 221. Lab.
A hands-on introduction to the mechanical design process. Basic prototyping skills developed using machine tools. Mechanical dissection used to demonstrate successful
M&AE 323 Introductory Fluid Mechanics
Fall. Usually offered in the summer through the Engineering Cooperative Program. 4 credits. Prerequisites: ENGRD 202 and 203 and coregistration in 221, or permission of instructor. Topics include properties of fluids, hydrostatics, conservation laws using control volume analysis and using differential analysis, Bernoulli's equation, potential flows, simple viscous flows (solved with Navier-Stokes equations), dimensional analysis, pipe flows, boundary layers, introduction to compressible flow.

M&AE 324 Heat Transfer
Spring. Usually offered in the summer through the Engineering Cooperative Program. 3 credits. Prerequisite: M&AE 323 or permission of instructor. Topics include steady and unsteady heat conduction: forced and free; radiation heat exchange, and heat exchangers and boiling.

M&AE 325 Analysis of Mechanical and Aerospace Structures
Fall. Usually offered in the summer through the Engineering Cooperative Program. 3 credits. Prerequisites: ENGRD 202 and M&AE 212 (strictly enforced). This course covers topics in the mechanics of materials applied to the analysis and design of structural components encountered in mechanical, aeronautical, and aerospace systems, including the following: torsion and bending of nonsymmetric or curved members, elastic stability, stress concentration, contact stresses, statically indeterminate structures, bound theorems for collapse of structures, and applications to composite and sandwich structures.

M&AE 326 System Dynamics
Spring. May be offered in Engineering Cooperative Program. 4 credits. Prerequisite: MATH 294, ENGRD 203. Junior standing required. 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.

M&AE 327 Mechanical Property and Performance Laboratory
Spring. 2 credits. Prerequisites: M&AE 212 and M&AE 325. 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.

M&AE 427 Fluids/Heat Transfer Laboratory
Fall. 3 credits. Prerequisites: M&AE 323, 324. Completes the short technical writing requirement. Laboratory exercises in fluid mechanics and the thermosciences. Measurements of flame temperature, pressure, heat transfer, viscosity, lift and drag, fluid-flow rate, effects of turbulence, air foil stall, flow visualization, and speciﬁc engine performance. Instrumentation, techniques and analysis, and interpretation of results. Biweekly written assignments with extensive feedback.

M&AE 428 Seminar on Engineering Design
Fall. 2 credits. Prerequisite: completion of 6 semesters in mechanical engineering or permission of instructor. This course is offered to illustrate the design "process" in action. It consists of formal lectures and invited seminars by industrial and academic practitioners of design. Case studies are prepared in weekly invited lectures from a wide range of disciplines, including thermo-fluid processes, manufacturing, energy, chemical design, aerospace, and biological sciences. The invited lectures are supplemented by one or more design "projects" in the semester.

M&AE 591 Applied Systems Engineering
(also CEE 504, COM S 504, ECE 512, OR&IE 516, SYSEN 510) 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 a strong system design component that is approved by a course instructor. For description see SYSEN 510.

M&AE 592 System Architecture, Behavior, and Optimization
(also CEE 505, COM S 505, ECE 513, OR&IE 513, SYSEN 510) Spring. 3 credits. Prerequisites: senior/graduate standing and completion of Applied Systems Engineering (CEE 504, COM S 504, ECE 512, M&AE 591, or OR&IE 512, SYSEN 510) or permission of instructor. See SYSEN 510 for description.

M&AE 103 Introduction to Computer-Aided Manufacturing (CAM)
Fall, spring. 1 credit, approximately eight weeks (total 15 hrs. of instruction and 15 hrs. of lab). Prerequisites: M&AE 225 or equivalent computational experience. 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 the use of G codes and solid modeling software, CNC mill and/or lathe setup, tool selection, and operation. The course is required for students wishing to use the CNC equipment in the Emerson Lab's Product Realization Facility's CNC seminars: An Introduction to CNC Machining and CNC Programming; or permission of instructor. Limited enrollment. 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 the use of G codes and solid modeling software, CNC mill and/or lathe setup, tool selection, and operation. The course is required for students wishing to use the CNC equipment in the Emerson Lab's Product Realization Facility for team or research projects. May not be used to fulfill any M&AE requirement.

M&AE 312 Mechanical Properties of Materials, Processing, and Design (also MS&E 302 and MS&E 582)
Spring. 4 credits. Prerequisite: MS&E 206. Corequisites: MS&E 304 or permission of instructor. For description, see MS&E 302.

M&AE 313 Atomic and Molecular Structure of Matter (also MS&E 206)
Spring. 4 credits. For description, see MS&E 206.

M&AE 378 Mechatronics
Fall. 4 credits. Prerequisite: MATH 294 (Engineering Mathematics II), PHYS 213 (Physics II: Heat/Electromagnetism), or permission of instructor. At the intersection of mechanical and electrical engineering, mechatronics involves technologies necessary to create automated systems. It introduces students to the fundamental elements of modern controlled dynamic systems. Topics include analog circuits (both passive and active components); filter design; transistors; diodes; MOSFETs and power amplification; transduction mechanical and electro-mechanical devices such as electromagnetic systems; piezoelectric and shape memory material transduction; gear trains; pulse width modulation; optical encoders; discretization, aliasing, and microprocessors and programming. Laboratory experiments culminate in the design and programming of a microprocessor-controlled robotic vehicle.

M&AE 386 Automotive Engineering
Spring. 3 credits. Prerequisite: M&AE 325 or permission of instructor. Selected topics in the analysis and design of vehicle components and vehicle systems. Emphasis on automobiles. Engines, transmissions, suspension, brakes, and aerodynamics will be discussed. The course uses first principles and applies them to specific systems. The course is highly quantitative, using empirical and analytical approaches. Co-requisites with M&AE 486.

M&AE 409 Data Structures and Algorithms for Computational Science (also CIS 409)
Fall. 4 credits. Prerequisite: COM S 100 or programming experience in any language. Not offered every year. Not offered 2016-2017. For description, see CIS 409.

M&AE 412 Smash and Crash: Mechanics of Large Deformations
Fall. 4 credits. Prerequisites: M&AE 212, TRAM 202. Fulfills field design requirement. Not offered 2004-2005. Severe loading is a defining feature of both materials processing and crashworthiness. Materials are stressed beyond their elastic limits intentionally, resulting in large permanent deformations. In materials processing, the desire is to change a workpiece shape to manufacture a component, in crash worthiness, the intent is to absorb a vehicle's energy and to protect its occupants. In this course the fundamentals of plasticity are covered: yielding, flow laws, work hardening. Various solution methods including bounding theorems, are presented. The fundamentals are applied to a number of topics in materials processing and crash design. The laboratory experience deals with these topics, culminating with the team design, construction, and testing of a crash cage.

M&AE 415 GPS: Theory and Design (also ECE 415)
Fall. 4 credits. Prerequisites: a 300-level engineering course with advanced math content such as ECE 413 or M&AE 326. For description, see ECE 415.
M&AE 417 Introduction to Robotics: Dynamics, Control, Design
Spring. 3 credits. Prerequisites: engineering math at the level of 293–294; some course in dynamics on the level of TAM/ENGRI 205; familiarity with control concepts typical of M&AE 320.
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, differential relationships and static forces, manipulator dynamics, trajectory generation, sensors and actuators, trajectory control, and compliant motion control. Simulation and design using MATLAB and multi-body codes are used.

M&AE 425 FSAE Automotive Design Project (Design Option)
Fall, spring. 3 credits for team members or 4 credits for team leaders. Intended for M&AE or ECE juniors and seniors or by arrangement with instructor. Usually 3 credits. Project consists of research, design, build, develop, and compete with a Formula SAE car for intercollegiate competition. Students work in interdisciplinary teams using concurrent engineering and specialized engineering principles applied to complex mechanical, electromechanical, and electronic systems.

M&AE 426 FSAE Auto Design Project (Design Option)
Fall, spring. 3 or 4 credits. Limited to M&AE seniors; permission of instructor only. Senior design version of M&AE 425. For description, see M&AE 425.

M&AE 440 Hybrid Electric Vehicle
Fall, spring. 3 credits for team members; 4 credits for team leaders. Enrollment limited to a maximum of 4 semesters. Permission of instructor only. Team work on the design and fabrication of a hybrid vehicle for national competition.

M&AE 441 Hybrid Electric Vehicle (Design Option)
Fall, spring. 3 or 4 credits. Limited to M&AE seniors; permission of instructor only. Senior design version of M&AE 440. For description, see M&AE 440.

M&AE 455 Introduction to Composite Materials (also CEE 475, M&AE 555, and TAM 455)
Spring. 3 credits. For description, see TAM 455.

M&AE 461 Entrepreneurship for Engineers (also ENGRG 461 and ORIE 452)
Fall. 3 credits. This course develops skills necessary to identify, evaluate, and begin new business ventures. Topics include intellectual property, competition, strategy, business plans, technology forecasting, finance and accounting, and sources of capital. A rigorous, quantitative approach is stressed throughout, and students create financial documents and plans, analyze human resource models, and work with sophisticated valuation methods, complicated equity structures, and legal and business documents. As such, this course represents the "red meat" of entrepreneurship, and the soft skills are left for other courses.
Course work consists of discussions, assignments, and the preparation and presentation of a complete business plan.

M&AE 463 Neuromuscular Biomechanics (also BMEP 463)
Spring. 3 credits. Prerequisites: ENGRD 202 and 203 or permission of instructor. Offered alternate years.
Modeling and simulation of biomechanical systems using mechanics, dynamics, and control principles. Physiology of neurons and muscles introduced and related to the production of force and movement in biological systems. Representation of neuromuscular systems as simultaneous equations. Exploration of the muscular redundancy problem using optimization methods and general-purpose languages (such as Mathematica or MATLAB). Selected clinical applications.

M&AE 464 Orthopaedic Tissue Mechanics
Spring. 3 credits. Prerequisites: ENGRD 202 and M&AE 325 or permission of instructor. Offered alternate years. Not offered 2004–2005.
Applications of mechanics and materials principles to orthopaedic tissues. Physiology of bone, cartilage, ligament, and tendon introduced and related 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.

M&AE 466 Biomedical Engineering Analysis of Metabolic and Structural Systems (also BMEP 401)
Fall. 3 credits. Prerequisites: ENGRD 202 and prior course work in basic biology or permission of instructor.
For description, see BMEP 401.

M&AE 470 Finite Element Analysis for Mechanical and Aerospace Design
Spring. 3 credits. Prerequisite: senior standing or permission of instructor. Limited enrollment. Evening examinations.
Term project satisfies senior design requirement for M&AE students. Introduction to linear finite element static and dynamic analysis for discrete and distributed mechanical and aerospace structures. Includes thermal, 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. Co-meets with M&AE 570.

M&AE 471 Mechanical Properties of Thin Films (also MS&E 512)
Spring. 3 credits. Prerequisite: M&AE 212 or 412, and introductory probability and statistics, or permission of instructor.
Nominal DFMA (design for manufacture and assembly) and variational DFMA are covered in two parallel streams. The nominal stream is based on readings in a popular text that surveys the role of manufacturing and assembly processes in product and plant design. The second stream, covered mainly through lectures, addresses dimensional variability and its control through parametric and geometric tolerances, dimensional metrology, and statistical quality and process control.

M&AE 472 Mechanical Properties of Materials (also CEE 472, ECE 472)
Spring or fall. 3 credits. Prerequisites: ECE 420 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 M&AE 579.

M&AE 473 Cost and Management Accounting
Fall or spring. 3 credits. Prerequisite: senior standing. Offered alternate years. Not offered 2004–2005.
For description, see M&AE 551.

M&AE 474 Feedback Control Systems (also CHEM 472, ECE 472)
Fall. 4 credits. Prerequisite: ECE 220 or M&AE 320 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 M&AE 579.

M&AE 475 Feedback Control Systems (also CHEM 472, ECE 472)
Fall. 4 credits. Prerequisite: ECE 220 or M&AE 320 or permission of instructor.
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**M&AE 525 Advanced Mechatronics-Systems Engineering Project (Robo Cup)**

Fall, spring. 4 credits each term (must be taken for 8 credits). Prerequisite: CHEM 372 or ECE 301 or M&AE 326 or permission of instructor. Fulfills M&AE senior design elective.

Project-based introduction to systems engineering with a focus on system design, systems and technology integration, and systems analysis. Approximately 30 students from the various engineering disciplines design, construct, and fully test several teams of fully autonomous mobile robots. These teams engage in head-to-head competitions at the end of the spring semester. There are approximately six lectures per semester and weekly group meetings with the instructor. The project involves vehicle design, real-time feedback control and trajectory generation, microprocessor design and implementation, wireless communication, computer vision, and artificial intelligence.

**M&AE 565 Biomechanical Systems—Analysis and Design (also BMPE 565)**

Fall. 3 or 4 credits. Prerequisites: Undergraduate courses in dynamics and strength of materials, (e.g., T&AM/ENGRD 202 and 203) and senior standing, graduate standing or permission of instructor. Mechanics and design in musculoskeletal systems. Emphasis on the modeling and analysis of bones and joints and the analysis and design of bone-implant systems for fracture fixation and joint replacement. Selected topics from the study of the human musculoskeletal system as a mechanical system. Emphasis on the modeling and analysis of bones and joints, and the analysis and design of biomechanical systems frequently encountered in orthopaedic engineering, including bone-implant systems.

**M&AE 570 Finite Element Analysis for Mechanical and Aerospace Design (also M&E 470)**

Spring. 4 credits. Prerequisite: Graduate standing or permission of instructor. Two 75-minute lectures each week. Introduction to multibody simulation using working model.

**M&AE 577 Engineering Vibrations**

Spring. 3 credits. Prerequisite: M&E 326 or equivalent, graduate standing, or permission of instructor. Graduate version of M&E 477.

For description, see M&E 477.

**M&AE 578 Feedback Control Systems**

Fall. 4 credits. Graduate version of M&E 478.

For description, see M&E 478.

**M&AE 579 Modeling and Simulation of Mechanical and Aerospace Systems**

Fall. 3 credits. Prerequisite: graduate standing or permission of instructor. Limited enrollment. Evening examinations. Term project. Graduate version of M&E 479.

For description, see M&E 479.

**M&AE 655 Composite Materials (also M&E 655 and T&AM 655)**

Spring. 4 credits. For description, see T&AM 655.

**M&AE 663 Advanced Topics in Neuromuscular Biomechanics (also BMPE 663)**

Spring. 3 credits. Permission of instructor only. Offered alternate years. Not offered 2004–2005.

F. Valero-Cuevas.

Advanced topics in modeling and simulation of biomechanical systems using mechanics, dynamics, and control principles. Mathematical representation of functional interactions among neurons, muscles, and skeletal structures. Numerical prediction of force and movement in biological systems, and projects exploring muscle coordination using optimization methods and general-purpose languages (such as Mathematica or MATLAB). Project-based investigation of clinically relevant topics.

**M&AE 664 Mechanics of Bone**

Spring. 3 credits. Prerequisites: graduate standing or permission of instructor. Offered alternate years. Not offered 2004–2005.

This course focuses on 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.

**M&AE 665 Principles of Tissue Engineering (also BMPE 665 and M&E 665)**

Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. L. Bonassar.

See BMPE 665 for description.

**M&AE 675 System Identification and Control**

Fall. 3 credits. Prerequisite: M&E 478/ECE 471/CEME 472, M&AE 521/ECE 521, or equivalent. Not offered 2004–2005.

Covers the identification of linear uncertain and nonlinear models and their connections to control. Black box methods, such as subspace methods, and model tuning approaches, such as recursive parameter estimation, are presented. Connections to control include the development of model uncertainties and bounds and control approaches consistent with identified models. Current trends in model identification for control are discussed. Other topics, such as hybrid models, are presented given enough time.

**M&AE 676 Model-Based Estimation**

Fall. 4 credits. Prerequisites: linear algebra, differential equations, and MATLAB programming. Open to M.S./Ph.D.; others by permission of the instructor. Offered alternate years. Not offered 2004–2005.

This course 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.

**M&AE 680 Finite Element Analysis (also CEE 676 and T&AM 666)**

Spring. 3 credits. Prerequisites: T&AM 663 and T&AM 610 or equivalent.

Conceptual, theoretical, and practical bases for finite element analysis in engineering, with emphasis on structural, mechanical, and thermal problems. Focusing on the FEM as a method for numerically solving partial differential equations. Topics include: strong and weak problem forms; weighted-residual and variational formulations: formulations for elliptic, parabolic, and hyperbolic problems (Laplace’s equation, elasticity, heat conduction, structural dynamics, wave propagation); meshing and error estimation; and various kinds of elements.
Energy, Fluids, and Aerospace Engineering

M&AE 305 Introduction to Aeronautics
Fall. 3 credits. Prerequisite: TAM-ENGRD 205; limited to upperclassmen, engineers, other M&AE students by permission of instructor.

M&AE 306 Spacecraft Engineering
Spring. 3 credits. Prerequisite: junior or senior M&AE 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.

M&AE 400 Components and Systems: Engineering in a Social Context (also S&S 400)
Spring. 3 credits. Prerequisites: upperclass standing, 2 years of college physics. Serves as an approved elective but not as a Field Elective in Mechanical Engineering. This course 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, we investigate interactions between the scientific, technical, political, economic, and social forces that are involved in the development of engineering systems.

M&AE 401 Components and Systems: Engineering in a Social Context
Fall. 4 credits. Prerequisites: M&AE senior standing, 2 years of college physics. Serves as a Field Elective in Engineering and the physical sciences. Offers 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.

M&AE 453 Computer-Aided Engineering: Applications to Biomedical Processes (Also BEE 453)
Spring. 3 credits. Prerequisite: BEE 350, CHME 324, M&AE 324, or equivalent.
Fulfills technical elective requirement for M&AE students. See BEE 453 for description.

M&AE 459 Introduction to Controlled Fusion: Principles and Technology (also ECE 484)
Spring. 3 credits. Prerequisites: PHYS 112, 213, and 214, 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 NS&EE 484.

M&AE 501 Future Energy Systems
Spring. 3 credits. Prerequisites: ENGRD 522 or equivalent, M&AE 323, 324 recommended or equivalent. Open to graduate and upperclass students or approval from instructor.
Critical examination of the technology of energy systems that will be acceptable in a world faced with global warming, 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 as well as the overall systems are analyzed.

M&AE 506 Aerospace Propulsion Systems
Fall. 3 credits. Prerequisite: M&AE 323 or permission of instructor. Offered alternate years.
Application of thermodynamic and fluid-mechanical principles to design and performance analysis of aerospace propulsion systems. Jet propulsion principles, including gas turbine engines and rockets. Electric propulsion. Future possibilities for improved performance or aerospace propulsion systems.

M&AE 507 Dynamics of Flight Vehicles
Spring. 3 credits. Prerequisites: M&AE 505 and M&AE 323, with 326 concurrently or permission of instructor. Offered alternate years.
Introduction to stability and control of atmospheric-flight vehicles. Review of aerodynamic forces and methods for analysis of linear systems. Static stability and control. Small disturbance equations of unsteady motion. Dynamic stability of longitudinal and lateral-directional motions; transient response to control input. MATLAB will be used extensively. At the level of Flight Stability and Control by Nelson.

M&AE 523 Intermediate Fluid Dynamics with CFD
Spring. 4 credits. Prerequisites: graduate standing or permission of instructor. This course is intended for M.Eng. students who wish to take a single-fluid dynamics course. Students desiring more intensive treatment should consider M&AE 601 and one or more of M&AE 636, M&AE 730, and M&AE 737. This class co-meets with M&AE 425. In addition to the normal requirements for M&AE 425, this course includes an extensive CFD design project.

M&AE 543 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: thermochromy, kinetics, vessel explosions, laminar premixed and diffusion flames, droplet combustion, and combustion of solids.

M&AE 601 Foundations of Fluid Dynamics and Aerodynamics
Fall. 4 credits. Prerequisite: graduate standing or permission of instructor. Introduces the fundamental fluid mechanics of 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.

M&AE 602 Fluid Dynamics at High Reynolds Numbers
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. Various stability problems associated with high Reynolds number flows are discussed. Finally, certain low Reynolds number flows associated with creeping motions or with ultra-small scale will be described.

M&AE 608 Physics of Fluids
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. Offered alternate years. Not offered 2004–2005.
Behavior of a gas is considered at the microscopic level. Introduction to kinetic theory: velocity distribution, collisions, Boltzmann equation. Quantum theory: postulates of quantum mechanics, internal structure, rigid rotor, harmonic oscillator, one-electron atom. Statistical mechanics: partition functions, relation to thermodynamics, calculations of thermodynamic properties. Chemical rate processes.

M&AE 627 Experimental Methods in Fluid Dynamics
Spring. 4 credits. Not offered 2004–2005. For description, see CEE 637.

M&AE 631 Turbulence and Turbulent Flows
Fall. 4 credits. Prerequisite: M&AE 601, 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.
M&AE 632 Multiphase Turbulence: Particulates, Drops and Polymer Suspensions
Spring. 4 credits. Prerequisites: M&AE 601, graduate standing, or permission of instructor. Not offered 2004–2005.
The course will cover turbulent transport of suspensions of microstructures: (i) particulates; (ii) drops; and (iii) polymer molecules. Topics include transport properties of individual microstructures, statistical averaging and the closure problem, Euler/Lagrangian methods, multiphase transport equations, direct numerical simulation and large eddy simulation. The course emphasizes fundamental questions concerning modeling of discrete phases by continuum means.

M&AE 636 Elements of Computational Aerodynamics
Fall. 4 credits. Prerequisites: graduate standing and a graduate-level course in fluid mechanics. Not offered 2004–2005.
Topics relevant to numerical solution of problems in aerodynamics and fluid mechanics. Analysis and application of computational techniques appropriate for solution of inviscid or high Reynolds number fluid flow problems. Course has common lectures with M&AE 736 but is more applications oriented and uses commercial software for all computational exercises.

M&AE 643 Computational Combustion
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. Offered alternate years. Not offered 2004–2005. S. B. Pope.
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 combustion at the level of M&AE 543, Turbulent Combustion Processes, is useful but not required.

M&AE 645 Turbulent Reactive Flow
Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. Offered alternate years. Not offered 2004–2005.
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 basic processes and governing equations, experimental observations, and a range of modeling approaches. Class meets, on average, twice per week.

M&AE 650 Evolutionary Computation and Design Automation (Also COM S 750, CIS 750)
Fall. 4 credits.
For description, see COM S 750.

M&AE 651 Conduction and Radiation Heat Transfer
Fall, weeks 1–7. 2 credits. Prerequisite: graduate standing; undergraduates by permission of instructor.

M&AE 652 Convection Heat Transfer
Fall, weeks 8–14. 2 credits. Prerequisite: graduate standing; undergraduates by permission of instructor.

M&AE 714 Computational Sensors: Information Technologies for Complex Continuum Systems
Fall. 4 credits. Prerequisites: exposure to computational mathematics. Some background in continuum systems and processes such as fluid flow, thermal transport and/or deformation of materials/structures. N. Zaharas.
Syllabus: examples of industrial control of continuum systems; mathematical preliminaries; finite element approach to partial differential equations; inverse problems and inverse problem solving; optimal control problems; numerical analysis of distributed control problems; reduced-order models for continuum systems; feedback laws for continuum systems; robust control and uncertainty; data mining of continuum systems and models; data compression and transmission; techniques for optimization; image processing; actuation and sensing of continuum fields.

M&AE 653 Convection Heat Transfer
Fall. 4 credits. Prerequisite: exposure to computational mathematics. Some background in continuum systems and processes such as fluid flow, thermal transport and/or deformation of materials/structures. N. Zaharas.

M&AE 736 Theory of Computational Aerodynamics
Fall. 4 credits. Prerequisites: graduate standing; an advanced course in continuum mechanics or fluid mechanics, and some higher-level (e.g., FORTRAN, MATLAB) programming experience. Not offered 2004–2005.
Numerical methods to solve inviscid and high-Reynolds number fluid-dynamics problems, including finite-difference, finite-volume, and surface-singularity methods. Accuracy, convergence, and stability; treatment of boundary conditions and grid generation. Focus on hyperbolic (unsteady flow with shock waves) and mixed hyperbolic-elliptic (steady transonic flow) problems. Assignments require programming a digital computer.

M&AE 737 Computational Fluid Mechanics and Heat Transfer
Fall. 4 credits. Prerequisites: graduate standing; an 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.

Special Offerings

M&AE 490 Special Investigations in Mechanical and Aerospace Engineering
Fall, spring. Credit TBA. Limited to undergraduate students. Prerequisite: 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.

M&AE 491 Design Projects in Mechanical and Aerospace Engineering
Fall, spring. 3 credits. Prerequisite or co-requisite: M&AE 428. Limited to M&AE seniors. Enrolls M&AE senior design requirement.
Intended for individual students or small groups of students who want to pursue particular design projects outside of regular courses. Students should adhere to the design process and documentation guidelines available at the M&AE undergraduate office.
Introduction to the physical principles and various engineering aspects underlying power generation by controlled fusion. Topics include fuels and conditions required for fusion power, and basic fusion-reactor concepts; fundamental aspects of plasma physics relevant to fusion plasmas, and basic engineering problems for a fusion reactor; and an engineering analysis of proposed magnetic and/or inertial confinement fusion-reactor designs.

NS&E 545 Energy Seminar (also ECE 587 and M&AE 545)  
Fall, spring. 1-credit course. May be taken for credit both semesters. D. A. Hammer. For description, see ECE 587.

M&AE 791 Mechanical and Aerospace Engineering Seminar  
Fall, spring. 1 credit each term. S-U grades only. For graduate students involved in research projects. Presentations on research in progress by faculty and students.

M&AE 799 Mechanical and Aerospace Engineering Colloquium  
Fall, spring. 1 credit each term. Credits limited to graduate students. Special lectures by faculty members on topics of current research.

M&E AE 545 Energy Seminar I (also ECE 587, NS&E 545)  
Fall. 1 credit.  
For description, see ECE 587.

M&E AE 546 Energy Seminar II (also ECE 588)  
Spring. 1 credit.  
For description, see ECE 588.

M&E AE 594 Enterprise Engineering  
Fall. 1 credit. (usually S-U) each term.  
For description, see OR&IE 893-894.

M&E AE 690 Special Investigations in Mechanical and Aerospace Engineering  
Fall, spring. Credit TBA. Limited to graduate students.

M&E AE 955 Special Topics in Mechanical and Aerospace Engineering  
Fall, spring. Credit TBA. Graduate standing and permission of instructor. Special lectures by faculty members on topics of current interest in mechanical and aerospace science, especially in connection with new research.

M&E AE 890 Research in Mechanical and Aerospace Engineering  
Credit TBA. Prerequisite: candidacy for M.S. degree in mechanical or aerospace engineering or approval of director. Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the faculty.

M&E AE 990 Research in Mechanical and Aerospace Engineering  
Credit TBA. Prerequisite: candidacy for Ph.D. degree in mechanical or aerospace engineering or approval of director. Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the faculty.

OPERATIONS RESEARCH AND INDUSTRIAL ENGINEERING

OR&IE 310 Industrial Systems Analysis  
Spring. 4 credits. Prerequisite or corequisite: ENGRD 270 or permission of instructor. J. Callister.  
This course presents 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.

OR&IE 320 Optimization I  
Fall. 4 credits. Prerequisite: MATH 221 or 294. J. Renegar.  
Formulation of linear programming problems and solutions by the simplex method. Related topics such as sensitivity analysis, duality, and network programming. Applications include such models as resource allocation and production planning. Introduction to interior-point methods for linear programming.

OR&IE 321 Optimization II  
Spring. 4 credits. Prerequisite: OR&IE 320 or equivalent. L. Trotter.  
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.

OR&IE 350 Financial and Managerial Accounting  
Fall. 4 credits. J. Callister.  
Course covers principles of accounting, financial reports, financial-projections analysis, financial-statement analysis, budgeting, job-order and process-cost systems, standard costing and variance analysis, and economic analysis of short-term decisions.

OR&IE 360 Engineering Probability and Statistics II  
Fall. 4 credits. Prerequisite: ENGRD 270 or equivalent. Staff.  
This second course in probability and statistics provides 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 minimum likelihood and the method of moments.

OR&IE 361 Introductory Engineering Stochastic Processes I  
Spring. 4 credits. Prerequisite: OR&IE 360 or equivalent. Staff.  
Basic concepts and techniques of random processes are used 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.

OR&IE 416 Design of Manufacturing Systems  
Fall. 4 credits. Senior OR&IE students only. Others by permission of instructor only. P. Jackson, J. Muckstadt.  
This is a 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 advisers are substituted for some lectures. Analytical methods for controlling inventories, planning production, and evaluating system performance are presented in lectures.

OR&IE 431 Discrete Models  
Fall. 4 credits. Prerequisites: OR&IE 320 and COM S 211 or permission of instructor. Not offered 2004-2005.

NUCLEAR SCIENCE AND ENGINEERING

Faculty members in the graduate Field of Nuclear Science and Engineering who are most directly concerned with the curriculum include K. B. Cady, D. A. Hammer, R. W. Kay, and V. O. Kostroun.

NS&E 484 Introduction to Controlled Fusion: Principles and Technology (also A&EE 484, ECE 484, and M&AE 489)  
Spring. 3 credits. Prerequisites: PHYS 112, 213, and 214, or equivalent background in electricity and magnetism and mechanics; permission of instructor. Intended for seniors and graduate students. D. A. Hammer.
Course 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.

**OR&IE 432 Nonlinear Optimization**
Fall. 4 credits. Prerequisite: OR&IE 320. Not offered 2004–2005.
This course is an introduction to the practical aspects of the mathematical techniques for optimization. Attention is given to the computational efficiency of algorithms and the application of nonlinear techniques to linear programming; e.g., interior-point methods. Methods of numerical linear algebra are introduced as needed.

**OR&IE 434 Optimization Modeling**
Emphasis is on modeling complicated decision problems as linear programs, integer programs, and highly structured nonlinear programs. Besides modeling, students are required to assimilate articles from the professional literature and to master relevant software.

**OR&IE 435 Introduction to Game Theory**
Fall. 4 credits. Prerequisite: OR&IE 320. M. Todd.
A broad survey of the mathematical theory of games, including such topics as two-person matrix and bimatrix games, cooperative and noncooperative n-person games, and games in extensive, normal, and characteristic function form. Encompasses all aspects of game theory. Applications to weighted voting and cost allocation.

**OR&IE 436 A Mathematical Examination of Fair Representation**
Spring. 3 credits. Prerequisites: MATH 222 or 294 or permission of instructor. J. R. Bland
This course 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. At first blush it appears that there is a straightforward approach that must lead to a fair, or fairest apportionment, for any fixed size house and known populations. However, indivisibility of seats leads us to interesting mathematical questions and a long, rich, and fractious political history involving many famous figures. The debate extends beyond apportionment of legislatures (in both federal systems and proportional representation systems) to some other realms where indivisible resources are to be allocated among competing constituencies.

**OR&IE 451 Economic Analysis of Engineering Systems**
Spring. 4 credits. Prerequisites: OR&IE 320 and OR&IE 350. X. Guo.
Course topics include financial planning, including cash-flow analysis and inventory flow models; engineering economic analysis, including discounted cash flows and taxation effects; application of optimization techniques, as in equipment replacement or capacity expansion models, and issues in designing manufacturing systems. Includes a student group project.

**OR&IE 452 Entrepreneurship for Engineers**
(also M&AE 461 and ENGRL 461)
Fall. 3 credits. Enrollment open to upperclass engineers, others by permission of instructor. J. Callister.
For description see M&AE 461.

**OR&IE 462 Introductory Engineering Stochastic Processes II**
Spring. 4 credits. Prerequisite: OR&IE 361 or equivalent. Not offered 2004–2005.
Course 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.

**OR&IE 464 Extreme Value Analysis with Applications to Finance and Data Communications**
Spring. 3 credits. Prerequisites: open to undergraduate and M.Eng. students who have had a stochastic processes course at the level of OR&IE 361 as well as a prior course in statistics. Not offered 2004–2005. S. Resnick.
The course will cover the basic models of extreme events used in hydrology, finance, insurance, environmental science (pollution controls), reliability, risk management. The basic models contain parameters that must be estimated, and graphical and analytic estimation methods are discussed. Extreme quantiles and very small exceedence probabilities need to be estimated, and usually the part of a distribution tail which is way beyond the range of the data needs to be considered. This leads to discussion of estimation needed for VAR (value-at-risk) calculations. The course material intersects the related fields of heavy tailed modeling and the implications of heavy tails in insurance and data networks.

**OR&IE 467 Credit Risk: Modeling, Valuation, and Management**
Spring. 4 credits. Prerequisite: OR&IE 361. K. Giesecke.
Credit risk refers to losses due to changes in the credit quality of a counter party in a financial contract. The course is an introduction to the modeling and valuation of credit risk. Emphasis will be on credit derivative instruments used for hedging credit risks, including credit swaps, credit options, and collateralized debt obligations.

**OR&IE 468 Financial Engineering with Stochastic Calculus I**
Fall. 4 credits. Prerequisite: knowledge of probability at the level of OR&IE 360. B. Rodi.
This course is an 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.

**OR&IE 469 Financial Engineering with Stochastic Calculus II**
Building on the foundations established in OR&IE 468/568, 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.

**OR&IE 473 Operations Research Tools for Financial Engineering**
Spring. 3 credits. Prerequisites: engineering math through MATH 294 and OR&IE 270 and 360. S. Resnick.
This course is an introduction to the applications of OR techniques, e.g., probability, statistics, and optimization, to finance and financial engineering. No previous knowledge of finance is required. The course 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. The use of MATLAB, MINITAB, and SAS for computation is also covered.

**OR&IE 474 Statistical Data Mining I**
Fall. 3 credits. Prerequisites: OR&IE 360 and MATH 294 or equivalent, or permission of instructor. A. Berdt.
This course 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.

**OR&IE 476 Applied Linear Statistical Models**
Spring. weeks 1–7. 2 credits. Prerequisite: ENGRD 270. T. Apanasovitch.
Course topics include multiple linear regression, diagnostcs, model selection, inference, and two factor analysis of variance. Theory and applications both treated. Use of MINITAB stressed.

**OR&IE 480 Information Technology**
Fall. 4 credits. Pre- or corequisites: COM S/ENGRD 211, plus either OR&IE 310 or OR&IE 350. E. Friedman.
This is a project course that encompasses various aspects of information technology related to operations research and industrial engineering. Topics include the design of databases and information systems, the World Wide Web, the economics and industrial organization of IT goods and services, electronic markets, and agent based interactions.
OR&IE 481 Delivering OR Solutions with Information Technology
Spring. 2 credits. Prerequisites: OR&IE 480. Enrollment limited. Staff.
Stud 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.

OR&IE 483 Applications of Operations Research and Game Theory to Information Technology
Spring. 3 credits. Prerequisites: OR&IE 321, OR&IE 361, or permission of instructor. D. Shimoy. This course 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 reputation in electronic interactions.

OR&IE 490 Teaching in OR&IE
Fall, spring. Varying credit. Prerequisite: permission of instructor. This course involves working as a TA in an OR&IE course. The course instructor assigns credits (the grading guideline is 1 credit per 4 hours of work per week of work with a limit of 3 credits).

OR&IE 499 OR&IE Project
Fall, spring. Varying 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.

OR&IE 512 Applied Systems Engineering I (also CEE 504, COM/S 504, ECE 512, M&A 591)
Full. 3 credits. Prerequisite: permission of instructor. R. Roundy. For description, see SYSEN 510.

OR&IE 513 Applied Systems Engineering II (also CEE 505, COM/S 505, ECE 513, M&A 593)
Spring. 3 credits. Prerequisite: Applied Systems Engineering I (CEE 504, COM/S 504, ECE 512, M&A 592, or OR&IE 512). P. Jackson. For description, see SYSEN 520.

OR&IE 515 Design of Manufacturing Systems
Fall. 4 credits. Prerequisite: permission of instructor. Limited to graduate students in Engineering and the Business School. For description, see ORIE 416.

OR&IE 516 Case Studies
Fall. 1 credit. Limited to M.Eng. students in OR&IE. M. Eisen. Students are presented with an unstructured problem that resembles a real-world situation. They work in project groups to formulate mathematical models, perform computer analyses of the data and models, and present oral and written reports.

OR&IE 518 Supply Chain Management
Spring. 3 credits. Prerequisite: one of the following: OR&IE 510, ORIE 416, ORIE 525, or ORIE 562. J. Muckstadt. 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&G). Usually spanning several corporations. Supply chain management focuses on the flow of products, information, and money through the supply chain. An overview of issues, opportunities, tools, and approaches. Emphasis is on business processes, system dynamics, control, design, re-engineering. Covers the relationship between the supply chain and the company’s strategic position relative to its clients and its competition. Considers dimensions of inter­corporate relationships with partners, including decision-making, incentives, and risk.

OR&IE 520 Operations Research I: Optimization I
For description, see ORIE 320.

OR&IE 521 Optimization I
For description, see ORIE 321.

OR&IE 522 Operations Research I: Topics in Linear Optimization
Fall. 1 credit. Prerequisite: OR&IE 520. Students who have already taken OR&IE 521 or 521 should not enroll. Limited to M.Eng. students in OR&IE. An extension of OR&IE 520 that deals with applications and methodologies of dynamic programming, integer programming, and large-scale linear programming.

OR&IE 523 Operations Research II: Introduction to Stochastic Processes I
For description, see ORIE 361.

OR&IE 524 Design of Manufacturing Systems
Spring. weeks 8-14. 2 credits. Prerequisites: OR&IE 562, ORIE 416; or by permission of instructor. Not offered 2004-2005.

This project course focuses on the design and analysis of a global corporation's operations. Working in teams, students examine issues pertaining to a prototype company on the following topics: information system design, marketing, strategy, location of facilities, organization design, manufacturing capacity, planning logistics, production planning, scheduling, inventory control, and financial analysis. Meetings between project teams and faculty are substituted for some lectures or laboratories. Analytical methods appropriate for conducting analysis are discussed in lectures.

OR&IE 525 Production Planning and Scheduling Theory and Practice
Fall. 4 credits. Corequisite: OR&IE 320, ORIE 500. P. Rosmevenmorgt. Topics covered include: production planning, including MRP, linear programming, and related concepts. Scheduling and sequencing work in manufacturing systems. Job release strategies and control of work in process inventories. Focus is on setup time as a determinant of plans and schedules.

OR&IE 528-529 Selected Topics in Applied Operations Research
Fall, spring. Varying credit. Prerequisite: permission of instructor. Current topics dealing with applications of operations research.

OR&IE 533 Heuristic Methods for Optimization (also CEE 509, COM/S 572, CIS 572)
Fall. 3 or 4 credits. Prerequisite: graduate standing or COM/S/ENGRD 211, 321 or CEE/ENGRD 241 or permission of instructor. For description, see CEE 509.

OR&IE 551 Economic Analysis of Engineering Systems
Spring. 4 credits. Prerequisites: OR&IE 320 and OR&IE 350. Lectures concurrent with OR&IE 451. For description see ORIE 451.

OR&IE 560 Engineering Probability and Statistics II
For description, see ORIE 360.

OR&IE 561 Queuing Systems: Theory and Applications
Fall. 3 credits. Prerequisite: ORIE 361 or permission of instructor. Not offered 2004-2005.

Course covers: basic queueing models; delay and loss systems; finite source, finite capacity, balk, 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.

OR&IE 562 Inventory Management
Spring. 3 credits. Prerequisite: ORIE 361, 361, or permission of instructor. R. Roundy. 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 of this course 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.

OR&IE 563 Applied Time-Series Analysis
Fall. 3 credits. Prerequisites: ORIE 361 and ENGRD 270 or permission of instructor. Not offered 2004-2005. The first part of this course treats regression methods to model seasonal and nonseasonal data. The second part of this course 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.

OR&IE 564 Introductory Engineering Stochastic Processes II
Spring. 4 credits. Limited to M.Eng. students. A. Berndt, K. Giesecke. This course has two components: a sequence of lectures and a project. The course is co­ listed with the Johnson School. The lectures are given by the faculty for the course and by invited speakers from the financial industry. The project satisfies the M.Eng. project requirement.

OR&IE 566 Extreme Value Analysis with Applications to Finance and Data Communications
Spring. 3 credits. S. Resnick. For description, see ORIE 464.
OR&IE 567 Credit Risk: Modeling, Valuation, and Management
Spring. 4 credits. Prerequisite: OR&IE 361. K. Giesenbauer.
For description, see OR&IE 467.

[OR&IE 569 Financial Engineering with Stochastic Calculus II
For description, see OR&IE 469.]

OR&IE 574 Statistical Data Mining II
This course is a continuation of OR&IE 474 and covers more advanced techniques such as clustering with applications to market segmentation, discriminant analysis, artificial neural networks, support vector machines, additive models, radial basis function and spline models, principal components, model assessment and selection, bagging, and boosting. Applications to business problems such as quantitative marketing and credit scoring are discussed.

OR&IE 575 Experimental Design
Spring. weeks 8–14 (alternates with 576). 2 credits. Prerequisite: OR&IE 476.
Course covers: randomization, blocking, sample size determination, factorial designs, 2p full and fractional factorials, response surfaces,拉丁平方, split plots, and Taguchi designs. Engineering applications. Computing in MINITAB or SAS.

[OR&IE 576 Regression
Course covers nonlinear regression, advanced diagnostics for multiple linear regression, collinearity, ridge regression, logistic regression, nonparametric estimation including spline and kernel methods, and regression with correlated errors. Computing in MINITAB or SAS.]

[OR&IE 577 Quality Control
Fall. 3 credits. Prerequisite: ENGRD 270. Not offered 2004–2005.
Course 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.]

OR&IE 580 Simulation Modeling and Analysis
Fall. 4 credits. Prerequisite: OR&IE 560 (may be taken concurrently) and computing experience, or permission of instructor: H. Topaloglu.

OR&IE 597 Systems Engineering Project
Fall; R grade only, spring; 8 credits. For M.Eng. students.
For M.Eng. students enrolled in the Systems Engineering Option. A 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 enters the course. (The following projects are pre-approved: SAE, IEEE, Robocup. Brain.) A formal report is required.

OR&IE 598 Master of Engineering Manufacturing Project
Fall. R grade only; spring, 5 credits. For M.Eng. students.
Project course for M.Eng. students enrolled in the Manufacturing Option coordinated by the Center for Manufacturing Enterprise.

OR&IE 599 Project
Fall. R grade only; spring, 5 credits. For M.Eng. students.
Identification, analysis, design, and evaluation of feasible solutions to some applied problem in the OR&IE field. A formal report and oral defense of the approach and solution are required.

OR&IE 625 Scheduling Theory
S. Shinoy. Scheduling and sequencing problems, including single-machine problems, parallel-machine scheduling, and shop scheduling. The emphasis is on the design and analysis of polynomial time optimization and approximation algorithms and on related complexity issues.

OR&IE 626 Advanced Production and Inventory Planning
Spring. 4 credits. H. Topaloglu. 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.

OR&IE 629 Foundations of Game Theory and Design for Engineering Applications
Spring. 3 credits. Class will not assume any prior knowledge of game theory or computer networks, but will assume a basic knowledge of operations research at the level of OR&IE 560 and OR&IE 650.
E. Friedmann. This course provides a rigorous foundation for the applications of mechanism design and game theory to problems in engineering such as data networks 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.

OR&IE 630 Mathematical Programming I
Fall. 4 credits. Prerequisites: advanced calculus and elementary linear algebra.
D. Shmoys.
A rigorous treatment of the theory and computational techniques of linear programming and its extensions, including formulation, duality, 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.

OR&IE 631 Mathematical Programming II
Spring. 4 credits. Prerequisite: OR&IE 630.
M. Todd.
A continuation of OR&IE 630. Introduction to nonlinear programming, interior-point methods for linear programming, complexity theory, and integer programming. Includes some discussion of dynamic programming and elementary polyhedral theory.

OR&IE 632 Nonlinear Programming
Fall. 3 credits. Prerequisite: OR&IE 630. A. Lewis.
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).

OR&IE 633 Graph Theory and Network Flows
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 2004–2005.
Topics covered 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.

OR&IE 634 Combinatorial Optimization
Fall. 3 credits. R. Bland.
Topics in combinatorial graphs and networks, including matching, matroids, polyhedral combinatorics, and optimization algorithms.

OR&IE 635 Interior-Point Methods for Mathematical Programming
Fall. 3 credits. Prerequisites: MATH 413 and OR&IE 650, or permission of instructor. Not offered 2004–2005.
Interior-point methods for linear, quadratic, and semidefinite programming and, more generally, for convex programming. Discussion of 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. Emphasis on recent mathematical theory and the most modern viewpoints.

OR&IE 636 Integer Programming
Fall. 3 credits. Prerequisite: OR&IE 630. Not offered 2004–2005.
Topics covered 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.

OR&IE 637 Semidefinite Programming
Spring. 2 credits. Pre- or corequisite: OR&IE 635. M. Todd.
Course 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.

OR&IE 639 Polyhedral Convexity
Spring. 3 credits. Prerequisite: basic knowledge of linear algebra. Not offered 2004–2005.
A comprehensive introduction to the geometry and combinatorics of polyhedral convex sets. Also, linear inequalities, supporting and separating hyperplanes; polarity, convex hulls, facets, and vertices; face lattices; convex sets and polytopes; Minkowski sums; Gale transforms; simplicial and polyhedral subdivisions; and applications to linear programming, combinatorial optimization, and computational geometry.
OR&IE 650 Applied Stochastic Processes
Fall 4 credits. Prerequisite: a 1-semester calculus-based probability course. X. Guo. An 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.

OR&IE 651 Probability
Spring 4 credits. Prerequisite: real analysis at the level of MATH 413 and a previous 1-semester course in calculus-based probability. G. Samorodnitsky. 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.

[OR&IE 662 Advanced Stochastic Processes
Fall 3 credits. Prerequisite: OR&IE 651 or equivalent. Not offered 2004-2005. Course topics include Brownian motion, martingales, Markov processes, and topics selected from: diffusions, stationary processes, point processes, weak convergence for stochastic processes and applications to diffusion approximations, Lévy processes, regenerative phenomena, random walks, and stochastic integrals.]

OR&IE 665 Storage and Data Communication Models
Fall 3 credits. U. Palibhui. This course covers a selection of topics including queues, storage, insurance risk, dams, and data communication. The basic assumptions of the underlying models are discussed with emphasis on their common features. The overall objective is the study of the stochastic processes that arise from these models. The approach is based on the fluctuation theory of random walks, Levy processes, and Markov-additive processes. Further topics for discussion include stochastic comparisons and statistical inference from the models with particular emphasis on data communication models. Current research on network models with discrete and fluid inputs is discussed.

OR&IE 670 Statistical Principles
Fall 4 credits. Corequisite: OR&IE 650 or equivalent. T. Apanasovich. 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.

[OR&IE 671 Intermediate Applied Statistics
Fall 3 credits. Prerequisite: OR&IE 670 or equivalent. Not offered 2004-2005. Course topics include statistical inference based on the 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.]

OR&IE 673 Empirical and Computational Issues in Finance
Spring 3 credits. Prerequisite: stochastic processes at the level of OR&IE 650 and statistics at the level of OR&IE 670, or permission of instructor. A. Bernt. This course is 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. The topics covered 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.

OR&IE 674 Statistical Learning Theory for Data Mining
Fall 3 credits. Prerequisites: Probability at the level of OR&IE 651, and statistical at the level of OR&IE 670. D. Ruppert. This course will provide a thorough grounding in probabilistic and computational methods for statistical data mining. We intend to cover 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.

OR&IE 677 Sequential Methods in Statistics
Spring 3 credits. S-U grades only. B. Turnbull. 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. Topics in this course include 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.

[OR&IE 680 Bayesian Statistics and Data Analysis
Spring 3 credits. Prerequisites: OR&IE 670 and some knowledge of measure theoretic probability, e.g., co-registration in OR&IE 650. Not offered 2004-2005. Priors, posteriors, Bayes estimators, Bayes factors, credible regions, hierarchical models, computational methods (especially MCMC), empirical Bayes methods, Bayesian robustness. The course will include data analysis and MCMC computation in WinBUGS and possibly other languages such as MATLAB.]

OR&IE 685 Simulation
Spring 4 credits. Prerequisite: computing experience and OR&IE 650 or equivalent, or permission of instructor. Not offered 2004-2005. Introduction to Monte Carlo and discrete-event simulation. Emphasis on underlying theory. Random variate generation, input and output analysis, variance reduction, selection of current research topics.]

OR&IE 728-729 Selected Topics in Applied Operations Research
Fall, spring. Credit TBA. Current research topics dealing with applications of operations research.

OR&IE 738-739 Selected Topics in Mathematical Programming
Fall, spring. Credit TBA. Current research topics in mathematical programming.

OR&IE 760-769 Selected Topics in Applied Probability
Fall, spring. Credit TBA. Topics are chosen from current literature and research areas of the staff.

OR&IE 778-779 Selected Topics in Applied Statistics
Fall, spring. Credit TBA. Topics chosen from current literature and research of the staff.

OR&IE 790 Special Investigations
Fall, spring. Credit TBA. For individuals or small groups. Study of special topics or problems.

OR&IE 799 Thesis Research
Fall, spring. Credit TBA. For individuals doing thesis research for master's or doctoral degrees.

OR&IE 891 Operations Research Graduate Colloquium
Fall, spring. 1 credit. Staff. A weekly 1-1/2 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.

OR&IE 893-894 Enterprise Engineering Colloquium (also M&AE 594)
893, fall; 894, spring. 1 credit (usually S-U) each term. A weekly meeting for Master of Engineering students. Discussion with industry speakers and faculty members on the uses of engineering in the economic design, manufacturing, marketing, and distribution and goods and services.

SYSTEMS ENGINEERING
P. L. Jackson, director; L. K. Nozick, director of graduate studies; M. Campbell, R. D'Andrea, R. A. Davidson, E. Garcia, A. R. George, J. A. Mackstadt, A. F. Myers, R. O. Roundy, F. B. Schneider, B. Selman, C. A. Shoemaker, J. R. Stedinger, R. J. Thomas, H. Topoloski, M. A. Turnquist

SYSEN 510 Applied Systems Engineering (also CEE 504, COM S 504, ECE 512, M &AE 591, OR&IE 512)
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 a strong system design component that is approved by a course instructor. A. R. George, R. Roundy. Fundamental ideas of systems engineering, and their application to design and development of various types of engineered systems. Defining system requirements, creating effective project plans, mathematical tools for system analysis and control, testing and evaluation, economic considerations, and the system life cycle.
SYSEN 511 Applied Systems Engineering
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 a strong system design component that is approved by a course instructor. Intended for off-campus students. Staff. For description see: SYSEN 510.

SYSEN 520 System Architecture, Behavior, and Optimization (M&AE 592, CEE 505, COM S 505, ECE 513, ORR&E 513)
Spring. 3 credits. Prerequisite: Applied System Engineering (M&AE 591, CEE 504, COM S 504, ECE 501, or ORR&E 512, SYSEN 520 or SYSEN 521) or permission of instructor. Staff. This is an advanced course in the application of the systems engineering process to the design and operation of complex systems. Topics introduced in Applied Systems Engineering I will be covered in greater depth. Topics include techniques for design, simulation, optimization, and control of complex systems. Case studies and system simulations in diverse areas will provide context for the application of these techniques. Students majoring in Systems Engineering enroll in SYSEN 520. Students taking Option in Systems Engineering enroll in M&AE 592, CEE 505, CS 505, ECE 513, or ORR&E 513. Students in Continuing Education enroll in SYSEN 521. Lectures are identical for all versions.

SYSEN 521 System Architecture, Behavior, and Optimization
Spring. 3 credits. Prerequisites: Applied System Engineering I Fundamentals or permission of instructor. Intended for off-campus students. Staff. For description see SYSEN 520.

SYSEN 570 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 571 Practicum in Systems Engineering
On demand. 3 credits. Staff. Supervised study by individuals or small groups of one or more specialized topics not covered in regular courses.

SYSEN 590 Systems Engineering Design Project
Fall. 6-8 credits. Prerequisites: 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 600 Topics in Systems Engineering Research
Fall. 1.5 credits. Staff. Advanced topics in systems engineering research.

SYSEN 681 Topics in Systems Engineering Research
Spring. 1.5 credits. Staff. Advanced topics in systems engineering research.

THEORETICAL AND APPLIED MECHANICS

Basics in Engineering Mathematics and Mechanics
T&AM 118 Design Integration: A Portable CD Player (also ENGR 118 and MS&E 118)
Spring. 3 credits. This is a course in the Introduction to Engineering series. For description, see ENGR 118.

T&AM 202 Mechanics of Solids (also ENGRD 202)
Fall, spring. 4 credits. Prerequisite: PHYS 112, coregistration in MATH 192, or permission of instructor. For description, see ENGRD 202.

T&AM 203 Dynamics (also ENGRD 203)
Fall, spring. 3 credits. Prerequisite: T&AM 202, coregistration in MATH 293, or permission of instructor. For description, see ENGRD 203.

Engineering Mathematics
T&AM 190 Calculus for Engineers (also MATH 190)
Fall. 4 credits. Prerequisite: 3 years of high school mathematics, including trigonometry and logarithms. For description, see MATH 190.

T&AM 191 Calculus for Engineers (also MATH 191)
Fall. 4 credits. Prerequisite: 3 years of high school mathematics, including trigonometry. For description, see MATH 191.

T&AM 192 Calculus for Engineers (also MATH 192)
Fall, spring, or summer. 4 credits. Prerequisite: MATH/T&AM 191. For description, see MATH 192.

T&AM 293 Engineering Mathematics (also MATH 293)
Fall, spring. 4 credits. Prerequisite: MATH/T&AM 192 plus a knowledge of computer programming equivalent to that taught in COM S 100. For description, see MATH 293.

T&AM 294 Engineering Mathematics (also MATH 294)
Fall, spring. 4 credits. Prerequisite: MATH/T&AM 293. For description, see MATH 294.

T&AM 310 Advanced Engineering Analysis I
Fall, spring. 3 credits. Prerequisites: MATH/T&AM 293 and 294. Course covers initial value, boundary value, and eigenvalue problems in linear ordinary differential equations. Also covers: special functions, linear partial differential equations. This is an introduction to probability and statistics. Use of computers to solve problems is emphasized.

T&AM 311/511 Advanced Engineering Analysis II
Spring. 3 credits. Prerequisite: MATH/T&AM 294 or equivalent (T&AM 311 can be taken without T&AM 310). Mathematical modeling of physical and biological systems. Examples range from molecular diffusion, lusitania swimmers, chemotaxis, and physiological flows, to bird flight. The mathematics necessary to understand these phenomena is discussed in depth. They include probability theory, PDEs, stability analysis, complex variable analysis, and numerical analysis. Students from all fields are encouraged to take the course.

T&AM 610 Methods of Applied Mathematics I
Fall. 3 credits. Intended for beginning graduate students in engineering and science. An intensive course, requiring more time than is normally available to undergraduates (see T&AM 310-311) but open to exceptional undergraduates with permission of instructor. Emphasis is on applications. Course covers: linear algebra, calculus of several variables, vector analysis, series, ordinary differential equations, and complex variables.

T&AM 611 Methods of Applied Mathematics II
Spring. 3 credits. Prerequisite: T&AM 610 or equivalent. Emphasis is on applications. Course covers: partial differential equations, transform techniques, tensor analysis, calculus of variations.

T&AM 613 Methods of Applied Mathematics IV
Spring. 3 credits. Prerequisite: T&AM 610 and 611 or equivalent. Topics include asymptotic behavior of solutions of linear and nonlinear ODE (e.g., the WKB boundary layer and multiple-scale methods) and asymptotic expansion of integrals (method of steepest descent, stationary phase, and Laplace methods). Also covers regular and singular perturbation methods for PDE (e.g., method of composite expansions). Other topics (depending on instructor) may include normal forms, center manifolds, Lapunov-Schmidt reductors, and Stokes phenomenon. The course may also include computer exercises at the option of the instructor.

T&AM 614 Methods of Applied Math V
Spring. 3 credits. Prerequisites: T&AM 610 plus T&AM 611 or equivalent. Not offered 2004-2005.

T&AM 617 Mathematical Biofluid Dynamics
Spring. 3 credits. Course topics include ciliary propulsion (biology); Eulerian realm: fish swimming, bird flight, etc.; review of potential flows; two-dimensional theory of lunate tails; unsteady airfoil theory; Weisflog mechanism of insect flight.

Continuum Mechanics
T&AM 455 Introduction to Composite Materials (also CEE 475, M&AE 455 and MS&E 555)
Spring. 3 credits. Course 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.

**T&AM 591 Master of Engineering Design Project I**
- Fall. 5-10 credits.

**T&AM 592 Master of Engineering Design Project I**
- Spring. 5-10 credits.

**T&AM 655 Composite Materials (also M&E 655 and MSE 655)**
- Spring. 4 credits.
- Taught jointly with T&AM 455 using same lecture material, but also includes more advanced material and homework through additional lectures. Additional material includes shear-lag models of stress transfer around arrays of fiber breaks, including viscoelastic effects, statistical theories of composite strength and failure; stress distributions around holes and cuts in composite laminates, and compressive strength of composites. Laboratory on effects of holes and notches in composites.

**T&AM 663 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.

**T&AM 664 Solid Mechanics II**
- Spring. 4 credits. Prerequisites: MATH 610 and T&AM 663 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; thermoelectricity; and three-dimensional elasticity.

**T&AM 666 Finite Element Analysis (also M&E 680 and CEE 772)**
- Spring. 3 credits. Prerequisites: T&AM 665 or equivalent.
- For description, see M&E 680.

**T&AM 751 Continuum Mechanics and Thermodynamics**
- Fall. 3 credits. Prerequisites: T&AM 610 and 611, and 663 and 664 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.

**Dynamics and Space Mechanics**

**T&AM 570 Intermediate Dynamics**
- Fall. 3 credits.
- Course 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-Fulerian mechanics of rigid bodies and gyroscopes.

**T&AM 578 Nonlinear Dynamics and Chaos**
- Spring. 3 credits. Prerequisite: MATH/T&AM 293 or equivalent.
- Introduction to nonlinear dynamics, with applications to physics, engineering, biology, and chemistry. Emphasizes analytical methods, computer algebra, and geometric thinking.
- Topics: one-dimensional systems; bifurcations; phase plane, nonlinear oscillators, and Lorenz equations; chaos, strange attractors, fractals, iterated mappings, period doubling, renormalization.

**T&AM 672 Celestial Mechanics (also ASTRO 579)**
- Spring. 3 credits. Offered alternate years.
- Course topics include description of orbits: 2-body, 3-body, and n-body problems; Hill curves, libration points and their stability; capture problems; oscillating orbital elements, perturbation expansions: effects of gravitational potentials, atmospheric drag, and solar radiation forces on satellite orbits, and secular perturbations, resonances, mechanics of planetary rings.

**T&AM 675 Nonlinear Vibrations**
- Spring. 3 credits. Prerequisite: T&AM 578 or equivalent.
- Offered alternate years.
- Quantitative analysis of weakly nonlinear systems in free and forced vibrations, perturbation methods, averaging method. Applications to problems in mechanics, physics, and biology. Additional topics may include Hopf bifurcation, Invariant manifolds, coupled oscillators, vibrations in continuous media, normal forms, and exploitation of symmetry.

**T&AM 776 Applied Dynamical Systems (also MATH 717)**
- For description, see MATH 717.

**Special Courses, Projects, and Thesis Research**

**T&AM 491-492 Project in Engineering Science**
- Fall. 491; spring, 492. 1-4 credits, as arranged.
- Projects for undergraduates under the guidance of a faculty member.

**T&AM 796-800 Topics in Theoretical and Applied Mechanics**
- Fall, spring. 1-3 credits, as arranged.
- Special lectures or seminars on subjects of current interest. Topics are announced when the course is offered.

**T&AM 890 Master's Degree Research in Theoretical and Applied Mechanics**
- Fall, spring. 1-15 credits, as arranged. S-U grades optional.
- 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.

**T&AM 990 Doctoral Research in Theoretical and Applied Mechanics**
- Fall, spring. 1-15 credits, as arranged. S-U grades optional.
- 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.
Bloom, Arthur L., Ph.D., Yale U. Prof.
Emeritus, Earth and Atmospheric Sciences
Bojdecki, Jane, Ph.D., U. of Paris (France). Prof.
Earth and Atmospheric Sciences
Bonassar, Lawrence J., Ph.D., Massachusetts Inst.
of Technology. Assoc. Prof., Mechanical and
Aerospace Engineering and Biomedical Engineering
Booker, John F., Ph.D., Cornell U. Graduate
School Prof. (Emeritus), Mechanical and
Aerospace Engineering
Brock, Joel D., Ph.D., Massachusetts Inst.
of Technology. Director and Prof., Applied
and Engineering Physics
Brown, Larry D., Ph.D., Cornell U. Prof.,
Earth and Atmospheric Sciences
Brutsaert, Wilfried H., Ph.D., U. of California
davis, William L. Lewis Prof. of
Engineering, Civil and Environmental Engineering
Buhman, Robert A., Ph.D., Cornell U. John
Edson Sweet Professor of Engineering,
Applied and Engineering Physics
Burns, Joseph P., Ph.D., Cornell U. Irving
Porter Church Professor of Engineering,
Theoretical and Applied Mechanics;
Astronomy
Burscher, Martin, Ph.D., U. of Colorado
at Boulder. Assoc. Prof., Electrical and
Computer Engineering
Cady, K. Bingham, Ph.D., Massachusetts
Inst. of Technology. Prof., Theoretical and
Applied Mechanics; Nuclear Science and
Engineering
Calister, John R., Ph.D., Cornell U. Kinzelberg
Director of Entrepreneurship in Engineering
Campbell, Mark E., Ph.D., Massachusetts Inst.
of Technology. Asst. Prof., Mechanical and
Aerospace Engineering
Cardie, Claire T., Ph.D. U. of Massachusetts at
Amherst. Assoc. Prof., Computer Science
Caruana, Richard, Ph.D., Carnegie Mellon U.
Asst. Prof., Computer Science
Cattell, Lawrence M. III, Ph.D., Princeton U.
Prof., Earth and Atmospheric Sciences
Caughey, David A., Ph.D., Princeton U. Prof.,
Mechanical and Aerospace Engineering
Chang, Hsiang-Dong, Ph.D., U. of California
at Berkeley. Prof., Electrical and Computer
Engineering
Clise, John L. Ph.D., U. of Chicago. Prof.,
Earth and Atmospheric Sciences
Prof., Chemical and Biomolecular Engineering
Cohen, Claude, Ph.D., Princeton U. Prof.,
Chemical and Biomolecular Engineering
Coleman, Thomas F., Ph.D., U. of Waterloo.
Prof., Computer Science
Prof., Mechanical and Aerospace
Engineering
Colucci, Stephen J., Ph.D., SUNY Albany.
Prof., Earth and Atmospheric Sciences
Constable, Robert L., Ph.D. U. of Wisconsin.
Prof., Computer Science
Conway, Harry D., Ph.D., London U.
Prof. Emeritus. Theoretical and Applied
Mechanics
Cook, Kenneth A., Ph.D., North Carolina State U.
Prof., Earth and Atmospheric Sciences
Cooke, J. Robert, Ph.D., North Carolina State
U. Prof., Biological and Environmental
Engineering
Cool, Terrill A., Ph.D., California Inst.
of Technology. Prof., Applied and Engineering
Physics
Cowen, E. A., Ph.D., Stanford U. Assoc.
Prof., Civil and Environmental Engineering
Craighead, Harold G., Ph.D., Cornell U.
Charles W. Lake Jr. Prof. of Engineering,
Applied and Engineering Physics
Cranich, Edmund T., Ph.D., Cornell U. Prof.
Emeritus, Theoretical and Applied
Mechanics
D’Andrea, Raffaello, Ph.D., California Inst.
of Tech. Assoc. Prof., Mechanical and
Aerospace Engineering
Datta, Ashish K., Ph.D. U. of Florida. Prof.,
Biological and Environmental Engineering
Davidson, Rachael A., Ph.D., Stanford U. Asst.
Prof., Civil and Environmental Engineering
Dawson, Paul R., Ph.D., Colorado State
U. Prof., Mechanical and Aerospace
Engineering
deBoer, P. C. Tobias, Ph.D., U. Maryland.
Graduate School Prof. (Emeritus),
Mechanical and Aerospace Engineering
DeGuastino, Arthur T., Ph.D., Rutgers U.
Assoc. Prof., Earth and Atmospheric Science
Delchamps, David F., Ph.D., Harvard U. Assoc.
Prof., Electrical and Computer Engineering
DeLisa, Matthew P., Ph.D., U. of Maryland.
Asst. Prof., Chemical and Biomolecular
Engineering
Demers, Alan, Ph.D., Princeton U. Prof.,
Computer Science
Derry, Louis, Ph.D., Harvard U. Assoc.
Prof., Earth and Atmospheric Science
Dick, Richard I., Ph.D., U. of Illinois. Prof.,
Civil and Environmental Engineering
Dieckmann, Rüdiger, Ph.D., U. Hannover.
Prof., Materials Science and Engineering
Duncan, T. Michael, Ph.D., California Inst.
of Technology. Assoc. Prof., Chemical and
Biomolecular Engineering
Prof., Mechanical and Aerospace Engineering
Dye, David, Ph.D., U. of Michigan.
Foundation Professor of Engineering,
Electrical and Computer Engineering
Elber, Ron, Ph.D., Hebrew U. (Israel). Prof.,
Computer Science
Engstrom, James R. Ph.D., California Inst.
of Technology. Assoc. Prof., Chemical and
Biomolecular Engineering
Escobedo, Fernando A., Ph.D., U. of
Wisconsin at Madison. Asst. Prof., Chemical and
Biomolecular Engineering
Fan, K.-Y. D., Cornell U. Asst. Prof.,
Computer Science
Farley, Donald T., Ph.D., Cornell U. J. Preston
Levis Professor of Engineering. Electrical and
Computer Engineering
Fine, Terrence L., Ph.D., Harvard U. Prof.,
Electrical and Computer Engineering
Fisher, Elizabeth M., Ph.D. U. of California
at Berkeley. Assoc. Prof., Mechanical and
Aerospace Engineering
Francis, Paul, Ph.D., University College
London. Assoc. Prof., Computer Science
Friedman, Eric, Ph.D., Berkeley. Assoc.
Prof., Operations Research and Industrial
Engineering
Fuchs, W. Kent, Ph.D., U. of Illinois at
Urbana-Champaign. Prof., Electrical and
Computer Engineering
Gaeta, Alexander L., Ph.D., U. of Rochester.
Prof. Applied and Engineering Physics
Garcia, Pedro, Ph.D., New York University.
Assoc. Prof., Mechanical and Aerospace
Engineering
Gehmledrin, Riffle G., Ph.D., U. of
Wisconsin. Prof., Biological and
Environmental Engineering, Civil and
Environmental Engineering
Gehrke, Johannes, Ph.D., U. of Wisconsin at
Madison. Asst. Prof., Computer Science
George, Albert R., Ph.D., Princeton U. John
F. Carr Prof. of Mechanical Engineering,
Mechanical and Aerospace Engineering
Giannakos, Emmanuel, Ph.D., Michigan State
U. Walter R. Read Professor of Engineering,
and Director Materials Science and
Engineering
Gosset, James M., Ph.D., Stanford U. Prof.,
Civil and Environmental Engineering
Goulchin, Frederick C., Ph.D., Princeton
U. Prof., Mechanical and Aerospace
Engineering
Greenberg, Donald P., Ph.D., Cornell U. Prof.,
Computer Science
Greene, Charles, Ph.D., U. of Washington.
Prof., Earth and Atmospheric Sciences
Gries, David, Ph.D., Dr rer. nat. Munich
Institute of Technology. Prof., Computer
Science
Grigoriu, Mircea D., Ph.D., Massachusetts
Inst. of Technology. Prof., Civil and
Environmental Engineering
Gruhn, David T., Ph.D., Oxford U. (England).
Assoc. Prof., Materials Science and
Engineering
Guckenheimer, John, Ph.D., U. of California
at Berkeley. Prof., Mathematics and
Theoretical and Applied Mechanics
Guo, Xin, Ph.D., Rutgers U. Asst.
Prof., Operations Research and Industrial
Engineering
Haus, Zygmun J., Ph.D., Stanford U. Assoc.
Prof., Electrical and Computer Engineering
Hayl, Douglas A., Ph.D., Cornell U. Prof.,
Biological and Environmental Engineering
Halpern, Joseph, Ph.D., Harvard U. Prof.,
Computer Science
Hammer, David A., Ph.D., Cornell U. J. Carlton
Ward Prof. of Nuclear Energy Engineering,
Mechanical and Computer Engineering
Hartmann, Jurie, Ph.D., California Inst.
of Technology. Walter R. Read Professor
Emeritus of Computer Science
Healey, Timothy J., Ph.D., U. of Illinois. Prof.,
Theoretical and Applied Mechanics
Hemami, Sheila S., Ph.D., Stanford U. Assoc.
Prof., Electrical and Computer Engineering
Henderson, Shane, Ph.D., U. of Michigan.
Assoc. Prof., Operations Research and
Industrial Engineering
Hopcroft, John E., Ph.D., Stanford U. IBM
Professor of Engineering and Applied
Mathematics, Computer Science
Hover, Kenneth C., Ph.D., Cornell U. Prof.,
Civil and Environmental Engineering
Hui, Chung Y., Ph.D., Harvard U. Prof.,
Theoretical and Applied Mechanics and
Mechanical and Aerospace Engineering
Hunter, John 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
Hyssell, David L., Ph.D., Cornell U. Assoc.
Prof., Earth and Atmospheric Sciences
Ingraffea, Anthony R., Ph.D., U. of Colorado.
Dwight B. Baum Prof. in Engineering, Civil
and Environmental Engineering
Irwin, Lynne H. Ph.D., Stanford U. M. U.
Assoc. Prof., Biological and Environmental
Engineering
Isacks, Bryan L., Ph.D., Columbia U. William
and Katherine Sneep Prof. of Earth and
Atmospheric Sciences
Jackson, Peter L. Ph.D., Stanford U. Prof.,
Operations Research and Industrial
Engineering
Lion, Leonard W., Ph.D., Stanford U. Prof., Civil and Environmental Engineering
Lipson, Howard, Ph.D., Technion Israel Institute of Technology. Assoc. Prof., Mechanical and Aerospace Engineering
Lipson, Michal, Ph.D., Technion (Israel). Asst. Prof., Electrical and Computer Engineering
Liu, Philip L.-F., Sc.D., Massachusetts Inst. of Technology. Prof., Civil and Environmental Engineering
Loucks, Daniel P., Ph.D., Cornell U. Prof., Civil and Environmental Engineering
Louveille, Richard V. E., Ph.D., Cornell U. Prof., Applied and Engineering Physics
Lunney, John L. Ph.D., Johns Hopkins U. Willis H. Carrier Professor (Emeritus) of Engineering, Graduate School Prof., Mechanical and Aerospace Engineering
Luo, Dan, Ph.D., Ohio State U. Asst. Prof., Biological and Environmental Engineering
Lynn, Walter R., Ph.D., Northwestern U. Prof., Civil and Environmental Engineering
Mallians, George G., Ph.D., Rijksuniversiteit Groningen (Greece). Asst. Prof., Materials Science and Engineering
Manikettam, Rama, Ph.D., Technion Inst. of Technology. Assoc. Prof., Electrical and Computer Engineering
Marschner, Steve, Ph.D., Cornell U. Asst. Prof., Computer Science
Martiner, Jose F., Ph.D., U. of Illinois at Urbana-Champaign. Asst. Prof., Electrical and Computer Science
Mwana, John, Ph.D., Cornell U. Sr. Research Assoc., Civil 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
Meyburg, Armin H., Ph.D., Northwestern U. Prof., Civil and Environmental Engineering
Miller, Matthew, Ph.D., Georgia Tech. Assoc. Prof., Mechanical and Aerospace Engineering
Moon, Francis C., Ph.D., Cornell U. Joseph C. Ford Professor, Mechanical and Aerospace Engineering
Moore, Franklin, Ph.D., Cornell U. Prof. (Emeritus), Mechanical and Aerospace Engineering
Muckstadt, John A., Ph.D., U. at California at Berkeley. Assoc. Prof., Electrical and Computer Engineering
Kuske, Bruce R., Ph.D., Massachusetts Inst. of Technology. Prof., Applied and Engineering Physics
Kulhawy, Fred H., Ph.D., U. of California at Berkeley. Prof., Civil and Environmental Engineering
Koch, Donald L., Ph.D., Massachusetts Inst. of Technology. Marjorie L. Hart '50 Professor of Engineering, Chemical and Biomolecular Engineering
Kozen, Dexter, Ph.D., Cornell U. Joseph Newton Pew, Jr. Professor in Engineering, Computer Science
Kulhawy, Fred H., Ph.D., U. of California at Berkeley. Prof., Civil and Environmental Engineering
Kuh, Amos J., Ph.D., U. of Pennsylvania. Assoc. Prof., Electrical and Computer Engineering
Lee, Kelvin, Ph.D., California Inst. of Technology. Assoc. Prof., Chemical and Biomolecular Engineering
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.D., Cambridge U. (U.K.). Prof., Operations Research and Industrial Engineering
Liddell, Chekessa, Ph.D., Georgia Institute of Technology. Asst. Prof., Materials Science and Engineering
Papoulia, Katerina D., Ph.D., U. of California at Berkeley. Assoc. Prof., Civil and Environmental Engineering
Park, Thomas W., Ph.D., Cornell U. Prof., Electrical and Computer Engineering
Parungao, Jean Yves, Ph.D., Brown U. Prof., Biological and Environmental Engineering
Pekoz, Teoman, Ph.D., Cornell U. Prof., Civil and Environmental Engineering
Persing, Andrew J., Ph.D., Cornell U. Assoc. Prof., Earth and Atmospheric Sciences
Phelan, Richard, M.M.E., Cornell U. Prof. (Emeritus). Mechanical and Aerospace Engineering
Philo, William D., Ph.D., U. of Delaware. Assoc. Prof., Civil and Environmental Engineering
Phelps, Morgan J., Ph.D., Brown U. Prof., Earth and Atmospheric Sciences
Phoenix, S. Leigh, Ph.D., Cornell U. Prof., Theoretical and Applied Mechanics
Mechanical and Aerospace Engineering
Pingali, Keshav K., Ph.D., Massachusetts Inst. of Technology. India Professor of Computer Science. Computer Science
Flisch, Monica J., Ph.D., Cornell U. Instructor, Applied and Engineering Physics
Pollack, Lois, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Applied and Engineering Physics
Pollack, Clifford R., Ph.D., Rice U. Ilda and Charles Lee Prof. of Engineering, Electrical and Computer Engineering
Pope, Stephen B., Ph.D., Imperial College of Science and Technology (England). Shibley College Professor of Mechanical Engineering. Mechanical and Aerospace Engineering
Pritchard, Matthew E., Ph.D., Princeton U. Assoc. Prof., Earth and Atmospheric Sciences
Proctor, Philip D., Ph.D., U. of California at San Diego. Prof., Operations Research and Industrial Engineering
Pstrzałek, Mark L., Ph.D., Princeton U. Assoc. Prof., Mechanical and Aerospace Engineering
Putnam, David, Ph.D., U. Utah. Asst. Prof., Chemical and Biomedical Engineering and Biomedical Engineering
Ralph, Daniel, Ph.D., Cornell U. Assoc. Prof., Physics
Rana, Farhan, Ph.D. Massachusetts Inst. of Technology. Asst. Prof., Electrical and Computer Engineering
Rand, Richard H., Sc.D., Columbia U. Prof., Theoretical and Applied Mechanics
Reaves, Anthony P., Ph.D., U. of Kent at Canterbury (England). Assoc. Prof., Electrical and Computer Engineering
Renegar, James, Ph.D., U. of California at Berkeley. Prof., Operations Research and Industrial Engineering
Resler, Edwin, Ph.D., Cornell U. Prof. Emeritus, Mechanical and Aerospace Engineering
Resnick, Sidney, Ph.D., Purdue U. Prof., Operations Research and Industrial Engineering
Rhodes, Frank H. T., Ph.D., U. of Birmingham (England). Prof. Emeritus/President Emeritus. Earth and Atmospheric Sciences
Richardson, Ruth E. Ph.D., U. of California at Berkeley. Assoc. Prof., Civil and Environmental Engineering
Riba, Susan, Ph.D. Washington State U. Prof., Earth and Atmospheric Sciences
Rossakis, Phoebe J., Ph.D., California Inst. of Technology. Prof., Theoretical and Applied Mechanics
GRADUATE SCHOOL

Alison G. Power, dean
J. Ellen Gainor, associate dean
Terry D. Plater, associate dean
Sarah S. Hale, assistant dean

Graduate study at Cornell is pursued through the Graduate School, which administers the many graduate fields of study, or through the various graduate professional schools and colleges.

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, the 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.

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 and usually has the primary responsibility for directing the student’s thesis or dissertation research.

REQUIREMENTS FOR ADMISSION

To be admitted to the Graduate School, an applicant should:

1) hold a baccalaureate degree or its equivalent, granted by a faculty or university of recognized standing;
2) have adequate preparation for graduate study in the chosen field of instruction;
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 General Test, or other specific examinations for those fields that require these examinations.

Before admission can be final, all applicants whose native language is not English must provide proof of competency in the English language. Acceptable proof could be:

1) a minimum Test of English as a Foreign Language (TOEFL) score of 213 (higher for some fields);
2) evidence of two or more years' study in, or a degree from, a college or university in a country where both the language of instruction and the native language are English.

Information on times and places for the TOEFL examination and Graduate Record Examinations and application forms may be obtained from the Educational Testing Service, Princeton, NJ 08541, U.S.A.

Applications for fall admission to the Graduate School should be received by the deadline of the field to which one applies. The earliest deadline is December 1. Many fields, however, have different deadlines. Applicants should consult the Graduate School’s application booklet for the specific closing date for each field.

Inquiries regarding admission should be addressed to the specific graduate field office or to the Graduate School, Cornell University, Caldwell Hall, Ithaca, N.Y. 14853-2602.

Inquiries regarding facilities for advanced study and research in a given field, special requirements for such study and research, and opportunities for fellowships and teaching and research assistantships should be addressed to the particular graduate field of interest.

More detailed information is contained in the application for admission to the Graduate School and in the Graduate School Catalog. Both may be viewed on the web at <www.gradschool.cornell.edu/>. An interactive application is available through this site, and application forms may be downloaded and printed directly from the web. The application may be received through the mail by contacting either the individual graduate field office or the Graduate School, Caldwell Hall, Cornell University, Ithaca, NY 14853-2602.

Note: Programs leading to the degrees of Doctor of Law (J.D.), Master of Laws (LL.M.), Doctor of Medicine (M.D.), Doctor of Veterinary Medicine (D.V.M.), and Master of Business Administration (M.B.A.) are not administered by the Graduate School. Information on these programs can be obtained from the Law School, the Weill Medical College of Cornell University (New York City), the College of Veterinary Medicine, and the Johnson Graduate School of Management, respectively.
The School of Hotel Administration's Nestlé Library has the largest single collection of hospitality-related materials in the United States. The collection contains approximately 25,000 books, 1,000 videotapes, numerous ephemera and memorabilia (such as photographs, menus, and rare books), and more than 800 journal, magazine, newsletter, and newspaper subscriptions. Materials on lodging, foodservice, travel and tourism, and general business topics comprise the core of the library's collections. Among the library's special features are numerous computerized information resources, including NEXIS, Dow Jones, ABI/INFORM, and The International Hospitality and Tourism Database: an extensive and unique index to hospitality articles. Information resources and services for the hospitality industry are available for a fee through the library's HOSTLINE service. In addition to offering an excellent collection of materials and a dignified and refined space, the Hotel School library extends quality service to every student.

Statler Hotel and J. Willard Marriott Executive Education Center The Statler Hotel comprises 150 guest rooms, an executive education center, restaurants, a lounge, and the university's faculty and staff club. It demonstrates the very finest in hospitality and hospitality-education practices. The Statler is an independent, self-sustaining teaching hotel that provides quality food, beverage, meeting, and lodging services to the local community and campus visitors, including parents and those who visit Cornell as part of the application process. In addition, the hotel is a practice-management facility for certain classes, internships, and independent-study projects. It offers part-time jobs to approximately 500 students each semester with preference given to students in the hotel school.

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, including those in 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 school's student handbook or course supplement (available in room 178, 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 terms in residence for those who entered as freshmen; terms of residence for transfer students are determined by the amount of transfer credit awarded;

2) completion, with a minimum cumulative grade-point average of 2.0 (including a grade-point average of 2.0 in a full-time schedule of courses on campus in the final semester), of 120 required and elective credits, 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: 1) three years of high school study of one foreign language; 2) score of 560 on Cornell Placement Test; 3) pass language course level 121 and 122 (eight credits) or the equivalent, and attain a minimum grade of at least C- or "Satisfactory" in each (C or above for transfer credit from other institutions); or 4) pass language course level 123 or the equivalent;

4) completion of two units of practice credit; and

5) completion of the university requirement in physical education.

Suggested course programs appear on the following pages. The core courses account for 69 of the 120 credits needed for graduation. The hotel school electives account for 12 credits, and 18 credits are allotted for distributive electives. The remaining 21 credits may be earned in courses chosen from the offerings of any college of the university, provided that the customary requirements for admission to such courses are met.

Students in the School of Hotel Administration who plan to attend summer school at Cornell or any other four-year college or university, with the expectation that the credit earned will be counted toward the Cornell degree in hotel administration, must obtain the approval of 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 18-credit group of free electives. No credit toward the degree is allowed for "00"-level courses, such as EDUC 005.

Transfer Credit Policy
Transfer students are required to complete all degree requirements with at least 75 credits at Cornell University, of which a minimum of 60 must be in courses offered by the School of Hotel Administration, and nine must be in distributive electives taken outside the hotel school. Thus, a maximum of 45 hours

DEGREE PROGRAMS

<table>
<thead>
<tr>
<th>Degree</th>
<th>Hotel and Restaurant Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.S.</td>
<td></td>
</tr>
<tr>
<td>M.M.H.</td>
<td></td>
</tr>
<tr>
<td>M.S.</td>
<td></td>
</tr>
<tr>
<td>Ph.D.</td>
<td></td>
</tr>
</tbody>
</table>

FACILITIES

Statler Hall Statler Hall is a unique building designed expressly to meet the needs of the faculty and students of the School of Hotel Administration. The building serves both practical and theoretical instruction, houses classrooms, lecture rooms, laboratories, a library, a computer center, a beverage-management center, a newly refurbished auditorium, and the Statler Hotel and J. Willard Marriott Executive Education Center. Statler Hall and the Statler Hotel were designed expressly 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 will open the Robert A. and Jan M. Beck Center, a $5,000-square-foot addition to Statler Hall. This $16.2 million expansion will provide state-of-the-art classroom and meeting spaces, a new computer laboratory, and teaching technologies that facilitate an interactive teaching style.

ADMINISTRATION
David W. Butler, dean
Leo Renaghan, associate dean for academic affairs
Margaret Haley Ferguson, associate dean for business administration
Steven A. Carvell, assistant dean
Gary M. Thompson, executive director, Center for Hospitality Research
Sheryl E. Kimes, Richard J. and Monene P. Bradley director for graduate studies
Brad Walp, director of enrollment management
Lisa M. Shaffer, director of graduate programs
Cheryl S. Farrell, director of student services
Neoma Mullens, associate director of admissions and student services
Millie Reed, director of career services
Walter C. Williams, director of alumni affairs and development
William C. Summers, director of communication strategy
Philippus Miller III, director of alumni affairs
Timothy J. Durnford, director of information technologies
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 Practice Credit Handbook for Undergraduates in the School of Hotel Administration, available in the school's career services office, room 255, 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. Students receive 12 free elective credits and 1 practice credit. While on the internship, tuition is reduced and students receive a salary from the sponsoring organization. Positions are available in the United States and internationally. Sponsors include, but are not limited to, hotels, restaurants, casinos, corporate offices, consulting firms, and clubs. Application should be made one semester in advance.

Information meetings are held at the beginning of each semester and are open to all students. See H ADM 493 and 494 for more details. More information about the management-intern program also is available in the career services office, 255 Statler Hall.

Study Abroad

All students planning to study abroad apply through Cornell Abroad; please see the Cornell Abroad program description in the introductory section of Courses of Study. The hotel school represents the international aspects of the hospitality industry in many ways—from the large number of international students in its program, to career opportunities throughout the world. To prepare for the global nature of the industry, students are encouraged to consider studying abroad in either the fall or spring semesters (or, in some cases, both). While abroad, students have the opportunity to learn about other cultures, become more proficient in a second (or perhaps third) language, and, in those programs where internships are offered, work in an international environment.

Students should start the process of investigation early, including consultation with Mrs. Farrell, the hotel school study abroad advisor, 174 Statler Hall, as well as with the study abroad advisor at either the fall or spring semesters. Students have the opportunity to learn about other cultures, become more proficient in a second (or perhaps third) language, and, in those programs where internships are offered, work in an international environment.

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Independent Study

Students may conduct independent study 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 project, students must obtain written permission from the school before the add deadline. See H ADM 499 or 699 for more details.

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Typical Course Sequences
The following arrangements of courses tend to be more fixed in the 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 term, to include the following:

<table>
<thead>
<tr>
<th>Required courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>H ADM 105, Introduction to Hotel Operations</td>
<td>2</td>
</tr>
<tr>
<td>H ADM 106, Introduction to Food Service Operations</td>
<td>2</td>
</tr>
<tr>
<td>H ADM 115, Organizational Behavior and Interpersonal Skills</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 121, Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 141, Microeconomics for the Service Industries</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 165, Managerial Communication I</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 174, 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>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>28</strong></td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Required courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>H ADM 201, Hospitality Quantitative Analysis</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 211, Human Resources Management</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 221, Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 222, Finance</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 236, Culinary Theory and Practice</td>
<td>4</td>
</tr>
<tr>
<td>H ADM 243, Principles of Marketing</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 255, Hotel Development and Planning</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 275, Introduction to Information Systems Management</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>31</strong></td>
</tr>
</tbody>
</table>

Junior Year

<table>
<thead>
<tr>
<th>Required courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>H ADM 301, Service Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 305, Restaurant Management</td>
<td>4</td>
</tr>
<tr>
<td>H ADM 321, Hospitality Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 355, Hospitality Facilities Operations</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 365, Managerial Communication II</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 387, Business and Hospitality Law</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>31</strong></td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Required courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>H ADM 441, Strategic Management</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>24</td>
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<tr>
<td><strong>Total Credits</strong></td>
<td><strong>27</strong></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, consult the school's graduate catalog (available in room 172 Statler Hall); contact the school's graduate services office at 255-7245, or see the university's Annunciation from the Graduate School.

Required Program for Professional Master's Students

<table>
<thead>
<tr>
<th>Required courses</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>H ADM 701, Quantitative Methods</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 702, Food and Beverage Management</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 710, Human Behavior in Organizations</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 711, Human Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 721, Financial Economics</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 722, Hospitality Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 740, Competitive Strategies for the Hospitality Industry</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 741, Marketing Management</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 742, Creating and Managing for Service Excellence</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 751, Properties Development and Planning</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 772, Information Technology for Hospitality Managers</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 793, Industry Mentorship Program</td>
<td>0</td>
</tr>
<tr>
<td>H ADM 795, Graduate Hospitality Management</td>
<td>0</td>
</tr>
<tr>
<td><strong>Balance of courses are electives.</strong></td>
<td></td>
</tr>
</tbody>
</table>

Total credits required for the Master of Management in Hospitality program: 64

Course Schedule Information
For up-to-date information about course scheduling, and to obtain a course supplement, contact the hotel school student services office in room 178 Statler Hall, telephone 255-3076.

ORGANIZATIONAL MANAGEMENT, COMMUNICATION, AND LAW

Management and Organizational Behavior

H ADM 110 Distinguished Lectures in Hospitality Management
Fall. 1 credit. Elective. D. Butler.

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.

H ADM 115 Organizational Behavior and Interpersonal Skills
Fall, spring. 3 credits. Required. C. Lundberg, T. Simons, K. Walsh. Focuses on managing people in the workplace. Students develop theoretic lenses for understanding people and organizations, and 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 case studies and assignments, experiential exercises, readings, discussions, papers, and group activities.

H ADM 314 High-Performance Leadership
Fall. 3 credits. Prerequisite: H ADM 115. Limited to 30 hotel school juniors and seniors. Graduate students should enroll in H ADM 614. Elective. J. Brownell. This course explores the nature of leaders and leadership from a variety of perspectives. Discussion of current articles in leadership prepare participants to be thoughtful leaders and discriminating consumers of leadership ideas. Topics include charismatic leadership, leadership characteristics, the exercise of power, symbolic communication, gender challenges, and related themes. Leadership will be examined from the individual, small group, and organizational perspectives. Case studies further illustrate the application of course material. Students will assess their own leadership style and engage in leadership-development activities. Class members will have opportunities to interact with hospitality leaders and to gain a better understanding of the dynamics of leadership behavior.
H ADM 410 Hospitality Management Seminar
Fall. 1 credit. Co-registration in H ADM 110 required. Limited to 30 hotel school seniors and graduate students. Elective. Pre-registered students or students wishing to add to the course who do not attend the first class and fail to notify the secretary in 146 Statler Hall of their absence before the first class will be automatically moved to the instructor's waiting list. Students permitted to take the course will have until Friday, September 3, 2004 to add the course. Failure to do so will result in their being dropped from the course. D. Butler. Complements H ADM 110 by giving students the opportunity to interact with guest speakers, and to participate in roundtable discussions on issues relating to the hospitality industry. The dialog can give students a better understanding of industry trends, challenges, and opportunities.

H ADM 411 Negotiations in the Hospitality Industry
Spring. 3 credits. Prerequisite: H ADM 115 or equivalent. Limited to 30 undergraduate students. Elective. T. Hinkin. Negotiation is a critical factor in business success. This course provides hands-on experience in negotiation in the hospitality context. Through role-play exercises, discussion, and writing, 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.

H ADM 414 Quality Planning in the Hospitality Industry
Spring. 3 credits. Prerequisites: all required hotel school undergraduate courses at the 100, 200, and 300 levels. Limited to 25 seniors and graduate students. Elective. T. Hinkin. Covers the analysis of work processes and examines operations from three perspectives: the external customer, the internal customer, and management. This course is designed to provide students with a systematic approach to identifying, prioritizing, and improving processes and work processes. Students learn to use the tools of quality management including cost of quality, flowcharting, statistical process control, and collecting, organizing, and presenting data. A major component of the course is HOTs, an interactive hotel simulation that is conducted as a group activity. This is a seminar course, requiring active participation in discussion of case studies.

H ADM 415 Managerial Leadership in the 21st Century
Spring. 1 credit. Elective. A $25.00 fee for the required textbook will be charged to student's bursar bill; textbook distributed on the first day of class. Friday, January 28 (1–9 P.M.), Saturday, January 29 (9 A.M. – 1 P.M.), Sunday, February 5 (9 A.M. – 5 P.M.), 2005 in the Statler Auditorium. K. Blanchard. Helps students become participant observers in their own lives through studying the field of applied behavioral science. Students will be able to use what they learn about human beings and how they function best in groups and organizations on a day-to-day basis to develop quality relationships between themselves and the people they support and develop behavior. Learning occurs primarily through readings, case studies, and self-reflective teamwork.

H ADM 416 High-Performance Leadership
Fall. 3 credits. Prerequisite: H ADM 710. Limited to 30 hotel school students. Juniors and seniors who should enroll in H ADM 314. Elective. J. Brownell. For description, see H ADM 314.

H ADM 603 Managing Across Cultural Boundaries
Fall. 3 credits. Elective. M. Taylor. With the rapid growth in the services sector and increasing globalization in the business environment, the ability to manage in the services context across cultural borders becomes crucial for management success. The objective of this three-section course is to learn how cultural context impacts the management process. The first section focuses on management practices that are relevant to management practices. Applying these frameworks, the second section focuses on comparative management practices. The last section covers international management practices. At the end of the course, the students should be able to explain how cultural context may affect management practices, and understand the implications for managing a culturally diverse workforce.

H ADM 610 Negotiations in the Hospitality Industry
Spring. 3 credits. Prerequisite: H ADM 710 or equivalent. Limited to 30 graduate students, seniors by permission of instructor. Elective. T. Simons. Negotiation is a critical factor in business success. This course provides hands-on experience in negotiation in the hospitality context. Through role-play exercises, discussion, and writing, 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.

H ADM 611 Negotiations in the Hospitality Industry
Fall. 3 credits. Elective. M. Taylor. With the rapid growth in the services sector and increasing globalization in the business environment, the ability to manage in the services context across cultural borders becomes crucial for management success. The objective of this three-section course is to learn how cultural context impacts the management process. The first section focuses on management practices that are relevant to management practices. Applying these frameworks, the second section focuses on comparative management practices. The last section covers international management practices. At the end of the course, the students should be able to explain how cultural context may affect management practices, and understand the implications for managing a culturally diverse workforce.

H ADM 614 High-Performance Leadership
Fall. 3 credits. Prerequisite: H ADM 710. Limited to 30 hotel school students. Juniors and seniors who should enroll in H ADM 314. Elective. J. Brownell. For description, see H ADM 314.

H ADM 610 Human Behavior in Organizations
Fall. 3 credits. Open to M.M.H. students only, except by written permission of the instructor in advance of pre-enrollment. M.M.H. requirement. T. Hinkin. This course focuses on manager and member behavior in organizations. Ideas and models about persons, interpersonal relationships, small groups, and organizations provide the basis for understanding the dynamics of effective organizational behavior. Learning occurs primarily through readings, case studies, and self-reflective teamwork.

Human Resources Management
H ADM 211 Human Resource Management
Fall, spring. 3 credits. Prerequisite: H ADM 115. Limited to 60 hotel school students per lecture; not open to freshmen or graduate students. Required. M. Sturman. B. Tracey. Provides students with a broad yet in-depth overview of HR policies and procedures and the opportunity to apply course topics to substantive situations that students will face as future hospitality professionals. Lectures, discussions, case studies, and videos.

Managerial Communication
H ADM 165 Managerial Communication I
Fall, spring. 3 credits. Note: students required to take this course generally may not delay it. If extenuating circumstances exist, the student must petition to drop the course by the end of the first week of classes. This course must be taken within the first two semesters in the school, including any semesters in the Internal Transfer Division (ITD). Add/drop and section exchange must be approved by the chairperson. Priority given to hotel school students. Limited to 16 students per lecture. Required. N. Dahl, D. Jameson, D. Lennox, C. Snow. An introduction to the role and importance of effective communication in managerial work, especially in the hospitality industry. Development of abilities in analytical thinking and clear expression. 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.
H ADM 364 Advanced Business Writing
Fall, spring. 3 credits. Priority given to hotel school students. Prerequisite: junior, senior, or graduate standing; or written permission of the instructor. School hotel undergraduates must have completed the H ADM 165 requirement or had it waived. Non-hotel school undergraduates must have completed their college's writing requirement. Limited to 20 students per lecture. Elective. Faculty. This course focuses on communicating challenging messages in business contexts. Writing assignments emphasize delivering persuasive messages, working with tone and style, and developing different types of documents in professional contexts. Different kinds of assignments are offered from semester to semester. Assignments often include business letters and memos written for various contexts, procedures and policy statements, promotional materials, negative messages, and the significant role of communication in management context. This course emphasizes additional topics include persuasion and negotiation across cultures, and group process and leadership.

H ADM 365 Managerial Communication II
Fall, spring. 3 credits. Priority given to hotel students. Prerequisites: Hotel school undergraduates must have completed H ADM 165 and H ADM 115. Limited to 22 juniors and seniors per lecture. Required. J. Brownell, N. Dahl, D. Lennox. A broad study of communication in a management context. This course emphasizes the significant role of communication in developing work relationships that enable managers to achieve their goals. It presents the theories and principles of persuasive communication that allow managers to influence professional audiences. Students increase their individual communication abilities by applying these concepts in a variety of managerial contexts, including interacting one-to-one, working in groups, and formally developing and presenting ideas to larger audiences.

H ADM 462 Communication and the Multicultural Organization
Spring. 3 credits. Priority given to hotel school students. Elective. D. Lennox. Successful managers are able to understand and bridge cultural differences as they guide organizations made up of people from a variety of backgrounds and worldviews. In the hospitality industry—with its global customer base and diverse service workforce—leaders must possess advanced communication skills that include an awareness of the ways culture affects interactions in the workplace. This course is designed to help managers develop proficiency communicating among and between people who do not share some of their own cultural assumptions. Students can expect to learn communication variables that differ among cultural groups, including the use of eye contact, body language, personal space, hierarchy, and time. Additional topics include persuasion and negotiation across cultures, and the ethics of communication in international business. The course is a blend of theory and practice. Class activities include lectures, guided discussions, group projects, student and guest speaker presentations, and analysis of specific cross-cultural managerial challenges, with emphasis on the service industry.

H ADM 761 M.M.H. Managerial Communication
Yearlong. Variable. Open to M.M.H. students only, except by written permission of the instructor in advance of pre-enrollment. Elective. D. Lennox, C. Snow. Introduction in communication and leadership skills helps students enrolled in the M.M.H. program reach their individual professional development goals, enrich their education, perform well on course assignments, and meet the program benchmarks in managerial writing, presentation speaking, and group process and leadership.

H ADM 385 Business Law I
Fall, spring. 3 credits. Open to hotel school juniors, seniors, and graduate students and non-hotel school students. Elective. P. Wagner. Provides students with a presentation of three substantive areas of business law: contracts, intellectual property, and business organizations. Students read judicial opinions, learn to identify issues, and analyze the issues applying legal principles.

H ADM 387 Business and Hospitality Law
Fall, spring. 3 credits. Limited to juniors, seniors, and graduate students. Required. D. Sherwyn. Provides students with an integrated presentation of employment discrimination, tort, and contract concepts as they apply to the legal aspects of hospitality management. The course examines relevant federal and state cases and statutes. The overall objective is to enable students to recognize, analyze, and evaluate legal issues for the purpose of making and articulating appropriate decisions in the workplace.

H ADM 485 Employment Discrimination Law and Union-Management Relations
Spring. 3 credits. Prerequisites: H ADM 387 or permission of the instructor. Limited to juniors, seniors, and graduate students. Elective. D. Sherwyn. Anti-discrimination statutes and union-management regulations are two of the most pervasive legal issues affecting the hospitality industry. Managers must take these issues into account whenever they make a personnel decision. This course provides students with an understanding of the discrimination law, a framework for complying with law, a method using the law to maintain positive employment relations, and an understanding of how to negotiate and administer a union contract.

H ADM 487 Real Estate Law
Fall, spring. 3 credits. Completion of H ADM 387 preferred but not mandatory. Limited to juniors, seniors, and graduate students. Elective. A. Klausner. Provides students with an understanding of the legal issues surrounding the ownership, transfer, and use and development of real estate. Students learn to recognize and evaluate legal issues to inform the decision-making process with respect to real estate, whether as a business executive, an entrepreneur, or in personal life.

H ADM 489 The Law of the Internet and e-Commerce
Fall. 3 credits. Limited to juniors, seniors, and graduate students. Elective. A. Klausner. The Internet has changed how business is done in the hospitality industry. The change has raised numerous legal issues that courts and legislatures are trying to decide on or enact. The purpose of this course is to allow students to identify and understand the rapid developments of the law of e-commerce. The course topics are: how the Internet works, consumer protection, privacy, intellectual property (patent, trademark, and copyright), personal jurisdiction in cyberspace, and online contracts and legal disclaimers. This course introduces students to this emerging area of the law and enables them to identify issues so that they can intelligently seek counsel and understand the law as it continues to evolve.

HOSPITALITY FACILITIES AND OPERATIONS

Food and Beverage Management
H ADM 226 Culinary Theory and Practice
Fall, spring. 4 credits. Prerequisite: H ADM 106. Required. Note: Because this course is laboratory-based, students may not drop after the second full week of classes. During the first two weeks of classes, students may drop only with permission of the instructor and/or the academic dean. B. Lang, T. O'Connor, R. White. 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 will prepare recipes, menus, and production schedules. Students will develop the ability to recognize properly prepared foods by preparing, tasting, and evaluating them. They also will be involved in a project where they create menus, develop and standardize recipes, and complete a plan for a dining event. Completion of a five-hour practicum experience is required. This is an academic course.

H ADM 334 Wine and Food Pairing Principles and Promotion
Spring. 2 credits. Prerequisite: H ADM 430. Limited to 20 hotel school seniors, and graduate students. Elective. G. Pezzotti. Focuses on the pairing and creative marketing of wine and food. Students develop an understanding of regional and varietal wine styles, world food flavors, and the promotion of wine and food. Topics include: wine and food pairing principles, cuisines and their flavor components, food trends in restaurants and at home, special event planning, and winery development. Students develop and present wine and food tastings to industry guests.

H ADM 339 Wine in Culture and History
Fall. 2 credits. Note: students may not add the course after the second lecture. Elective. A. Nash. Regions: Germany and Champagne. Through lectures, videos, guest discussions, and readings (but not tastings), students examine the history, people, culture, and production
of wine in the world’s great wine regions. Also covered are wine and health issues, wine and food pairing, and retail wine buying and storage strategies. Different regions are covered in the fall and spring (H ADM 439), so the course may be taken both terms in either sequence. Neither term is a prerequisite for the other, nor are H ADM 430 Introduction to Wines and H ADM 339 and 439 prerequisites for the others.

H ADM 430 Introduction to Wines
Fall, spring. 2 credits. Limited to juniors and seniors in the hotel school and graduate students in all other colleges. Hotel school students are strongly encouraged to enroll in the fall semester. Students are exempt from the 21-year age requirement under Section 65 of New York State law. Preregistered students who do not attend the first class and fail to notify the secretary in 274 Statler Hall of their absence before the first class are automatically dropped from the instructor’s records. Because of the high demand for this course and because a product is consumed, the absolute drop deadline in the fall for all students is Friday, October 10, 2004, and the drop deadline in the spring is Friday, February 4, 2005. The course fee of $50.00 includes the cost of a wine glass and tasting kit. No auditing allowed. Elective. S. Mutkoski, A. Nash. An introduction to the major wine-producing regions of the world, and what the consumer needs to know to purchase wine at retail outlets and in a restaurant setting. Lecture topics include 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.

H ADM 432 Contemporary Healthy Foods
Fall. 3 credits. Prerequisite: H ADM 305 or equivalent. Preference is given to 20 seniors and graduate students. Others may enroll, space permitting. One field trip is required (cost $50). Elective. M. Tabacchi. Designed to build a greater awareness and understanding among nutrition and foodservice professionals of the origins and manifestations of today’s health conscious and educated foodservice patron. The course addresses the marriage of nutrition and the imaginative, flavorful cuisine demanded by today’s consumer. Emphasis is on the use of fresh produce, lean meats, and lack of fabricated diet foods. Creativity and nutrient density of foods served are very important components of menu design in this course. Key topics include the preparation, marketing, merchandising, and selling of healthy menus in the Statler Hotel.

H ADM 435 Selection, Procurement, and Supply Management
Fall. 2 credits. First seven weeks of the semester. Limited to 20 hotel school juniors and graduate students or others by permission. Add/drop deadline is September 2, 2004. G. Norkus. This course deals with contemporary management issues related to the procurement activities of the hospitality industry. The course focuses on both the food distribution industry and the hospitality industry so that students understand the role the distributor plays in the movement of food and supplies from the producer to the hospitality operator, and how the creation of distributor partnerships serves to improve efficiency and reduce costs. Topics covered include: distribution channels and intermediaries in the supply chain, food distributor financial statement analysis, evaluation and selection of suppliers, developing buying strategies, purchasing and inventory management, the emerging role of the Internet, and e-procurement service providers.

H ADM 436 Beverage Management
Spring. 2 credits. Prerequisite: H ADM 430. Co-requisite: H ADM 435. Limited to 25 hotel school juniors, seniors, and graduate students. Elective. S. Mutkoski, A. Nash. Designed for students who intend to pursue food and beverage management as a career. The course deals specifically with the management of beverage operations, including: lecture topics cover: beverage pricing, food and wine pairing, wine list development; purchasing, storage, and service; wine regions; cost controls and loss prevention; and creative beverage merchandising. Guest lectures highlight industry trends and outlooks.

H ADM 437 Anheuser-Busch Seminar In Quality Brewing and Fine Beer
Fall, spring. 2 credits. Prerequisite: H ADM 430. Offered during the first seven weeks of the semester only. Elective. G. Pizzotti. Designed for upper-level students who intend to pursue food and beverage careers. The course serves to advance one’s 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 styles and types, marketing malt products, purchasing and distribution, storage and service, beer and food pairings, staff training and education, cost controls, and third-party liability issues. There is one required field trip.

H ADM 438 Seminar In Culture and Cuisine
Fall. 3 credits. Prerequisites: H ADM 105 and H ADM 201. Co-requisite: H ADM 202. Required. Limited to 20 students. Elective. R. Spies. This seminar explores various cuisines in terms of history, lifestyle, and foods peculiar to a culture. Through readings, research, and meal preparation, students explore various cuisines in depth. The goal of the course is to develop an awareness of several international cuisines enabling students to make comparisons and draw relationships among foodways of different cultures. Possible incorporation of each cuisine into restaurant menus is discussed as well. Each student is involved in doing research reports,oral presentations, and designing and orchestrating the preparation of menus.

H ADM 439 Wine in Culture and History—II
Spring. 2 credits. Elective. Note: Students may not add the course after the second lecture. A. Nash. Regions: Bordeaux, Burgundy, and California. Provides students a cultural and historical perspective on wine and its place in society. Through lectures, videos, guided discussions, and readings students examine the historical people, culture, and production of wine in the world’s great wine regions. Also covered are wine and health issues, wine and food pairing, and retail wine buying and storage strategies.

Operations
H ADM 105 Introduction to Hotel Operations
Fall, spring. 2 credits. Limited to 20 hotel school students only. Required. R. McCarthy. Note: This course must be taken in conjunction with H ADM 109, Introduction to Food Service Operations. Students enrolled in Lecture 1 of H ADM 105 will take Lecture 1 of H ADM 106 in the same semester, and vice versa.

Designed to provide students with an introduction to the scope of the hospitality industry. The course serves to advance one’s 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 styles and types, marketing malt products, purchasing and distribution, storage and service, beer and food pairings, staff training and education, cost controls, and third-party liability issues. There is one required field trip.

H ADM 106 Introduction to Food Service Operations
Fall, spring. 2 credits. Limited to 30 hotel school students per section. Required. G. Norkus. Note: This course must be taken in conjunction with H ADM 105, Introduction to Hotel Operations. Students enrolled in Lecture 1 of H ADM 106 will take Lecture 1 of H ADM 105 in the same semester, and vice versa.

An introduction to the principles of food and beverage management, beginning with an overview of the foodservice industry at large. Attention is focused on major industry segments, business practices, and trends. Subsequently, detailed consideration is given to the components of the foodservice system: menu planning and production, service, and controls and quality assurance. The course is designed for the student who intends to pursue a career in this field. The course is available to seniors and graduate students in all other colleges. Others may enroll, space permitting. Add/drop deadline in the fall is September 2, 2004. G. Norkus. Required. Limited to 30 hotel school students only. Required. R. Lloyd. An introductory course taught from the perspective of solving problems and making decisions within the hospitality industry. Students will learn some introductory probability and how to gather data, evaluate the quality of data, graphically represent data, and apply some fundamental statistical methodology. Statistical methods covered will 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) will be covered as a special case of multiple regression, time allowing. Minitab will be used as the statistical computing software.
H ADM 301 Service Operations Management
Fall, spring. 3 credits. Limited to 60 hotel school students per lecture. Limited to 20 students per section. Required. B. Noone, M. Pullman.
Introduces statistical and operations research methods appropriate for the hospitality industry. The goal of the class is to provide students with the tools and understanding necessary for decision making using quantitative data. Students use computer spreadsheet software extensively. A key requirement of the course is an ability to communicate the results of the analyses in a clear manner. Topics include: probability, decision analysis, modeling, forecasting, quality management, process design, waiting lines, and project management.

H ADM 303 Club Management
Fall, spring. 2 credits. Not open to freshmen. Second 7 weeks in the fall: limited to 35 hotel school junior and seniors who must have completed H ADM 105 or equivalent. First 7 weeks in the spring: open enrollment. The deadline to drop a seven-week course is the midpoint of the course. Elective.
The study of 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 compared to other areas of the hospitality industry and other not-for-profit organizations. Topical coverage includes: tournament, facility, and recreation management; legal, financial, and legislative issues; human relations and human resource considerations; and marketing, pricing policies, and quality standards.

H ADM 305 Restaurant Management
Fall, spring. 4 credits. Prerequisites: H ADM 106 and H ADM 236. Limited to 27 hotel school students per lab. Approximate cost of lab manual, certification for alcohol servers, and foodservice and beverage management is $85.00. Required. Because this is a group course, the absolute deadline to drop the course in the fall is September 2, 2004, and the deadline to drop the course in the spring is January 31, 2005. R. Spies.
Offers the opportunity to synthesize the skills, concepts, and theories students have learned in other classes and practically apply them in an actual restaurant setting. Lecture topics cover pertinent issues and principles relevant to the industry at large and then, as a class, the principles are incorporated into actions that occur in the student-run operation.

H ADM 401 Restaurant Entrepreneurship
Fall, spring. 3 credits. Limited to 20 hotel school students with written permission of the instructor. R. James.
Prepared to incur expenses over the term of the semester for five required field trips, totalling no more than $350.00. Elective. G. Pezzotti.
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 utilizing student-developed case studies, the students visit and analyze various independently owned 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 relative to current topics in the restaurant industry are required. Classes alternate weekly between field trips (2:30 p.m. through dinner hour) and seminar/case presentation.

H ADM 402 Contract Foodservice Management
Fall. 3 credits. Prerequisites: H ADM 106 and H ADM 236. Limited to 30 juniors, seniors, and graduate students. Elective.
Operations in business and industry, healthcare, sports complexes, and education, as well as other on-site segments, represent more than one fourth of total restaurant-industry sales. This course addresses the major differences between onsite foodservice management and traditional restaurant management with particular focus on organizational structure, operational configuration, controls, labor issues, systems design and implementation, contractual issues, and revenue enhancement/cost containment. Related topics such as event planning and senior living are also discussed. Includes readings, discussions with industry leaders, case studies, course tests, and an integrated research project.

H ADM 403 Specialty Food and Beverage Operations: Guest Chefs
Spring. 3 credits. Prerequisites: H ADM 305 or H ADM 702 with permission of the instructor. Limited to 20 hotel school juniors, seniors, and graduate students with permission of the instructor. Elective. G. Pezzotti.
Designed for students focusing in food and beverage preparation. Students considering a career in the hotel or restaurant food and beverage environment or those who anticipate interacting with present-day culinary trends will find the course especially beneficial. Over the course of the semester, the class, working in groups, is responsible for the marketing, organization, financial planning, marketing, and 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/her culinary background, and the group is responsible for producing the meal for the Cornell community using the hotel facility. Required final project analyzes the relative degree of success experienced during each guest-chef event. The analysis considers consumer reaction as well as proper application of food and beverage management principles.

H ADM 404 Catering and Special Events Management
Spring. 3 credits. Prerequisites: H ADM 236, or permission of instructor. Limited to 30 students. Field trip to New York City; approximate cost $250. Elective. R. Spies.
The catering and special events industries are among the fastest growing segments of the hospitality industry. This course focuses on off-premise and on-premise catering for social and business functions, and the management of large-scale independent events, such as sporting events, artistic performances, and product launches. Topics include: organizational structure, legal aspects of catering and special events management, product and service development, marketing and sales, catered function and special event planning and execution, staff recruitment and training, post event analysis, financial success of catering, and special events businesses.

H ADM 407 Seminar in Hotel Operations
Spring. 3 credits. Limited to 30 juniors and seniors. The estimated cost of the field trips is $250. Elective. R. McCarthy.
In this seminar-style class, students develop their leadership abilities through a series of hands-on projects for the Statler and Waldorf-Astoria hotels. Students gain experience by identifying the requirements and challenges of a project, creating a plan, and carrying out the leadership responsibilities that will result in others successfully implementing their recommendations. Drawing on their specific knowledge and skills in all the academic disciplines, students gain a broader perspective on the hotel as a business organization. They investigate the combination of human and technical forces that make a hospitality business succeed or fail. Emphasis is on reconciling the real or apparent conflicts between theory, as learned in the students' college courses, and practice, as observed in actual hotel operations. Upon completion of the course, students will be able to evaluate issues and formulate cogent strategies for managing hotel operations.

H ADM 408 Introduction to Casino Operations
Fall. 2 credits. Limited to hotel school students. One required field trip to Atlantic City will cost approximately $200. Elective. R. McCarthy.
A vital part of the hospitality industry, casino gaming is one of the most exciting and fastest growing industries. In this course we focus primarily on the operation and ownership of commercial casinos and the hotels attached to them. The course is designed to introduce students to the internal and external casino environment. We look 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 and marketing strategies and player rating systems; the social and economic impact of gaming and the various regulatory environments within which casinos operate; and how common casino games are played and the mathematics of the various games. Students build on their food and beverage and hotel knowledge to better understand the specific challenges facing casino hotel operators.

H ADM 602 Spa and Spa Hotel and Resort Development and Management
Fall, spring. 3 credits. Preference is given to 35 hotel school seniors and graduate students; others may enroll, space permitting. Two field trips are required; approximate cost $75-100. Elective. M. Tabacchi.
Emphasizes the development, management and marketing of spas, spas in hotels and resorts, and spa restaurants. Day spas, resort spas, and destination spas are studied in depth. The feasibility of success for new spas and marketing research necessary to establish new spas is discussed. The design of menus, mental and physical fitness programs, stress management, spa medical treatments.
complementary medical treatments, and other spa programs are all considered. Personnel required, safety, legal, and ethical issues facing spas are an important part of the course. The integration of nutritious menu items into restaurant menus and their marketing and merchandising is studied. Guest speakers from spas are an integral part of the course.

H ADM 604 Service Operations Management
Fall. 3 credits. Prerequisite: H ADM 775, or equivalent. Limited to 25 graduate students. Elective. G. Thompson. Improves the understanding of the operations function of service organizations. The course focuses on the functions and nature of service operations and the relationship of operations to other business functions, and develops skills and provides techniques for the effective management of service operations. Topics covered include service design, bottleneck and layout analysis, capacity management, workforce management, and quality management. This course is intended for any graduate students interested in services management.

H ADM 605 Yield Management
Fall, spring. 3 credits. Prerequisite: H ADM 301, H ADM 302, or equivalent. Limited to 30 seniors and graduate students. Elective. S. Kimes, B. Noone. Helps students learn how to effectively apply the principles of yield management. The course focuses on the integration of yield management techniques with information technology, internal management issues, and external marketing concerns. Topics covered include yield management techniques, forecasting, overbooking, group decisions, and management and marketing issues.

H ADM 606 Restaurant Revenue Management
Spring. 2 credits. First seven weeks of the semester. Prerequisites: H ADM 701 and H ADM 702. Limited to 30 graduate students. Permission of the instructor. Note: the deadline to drop a seven-week course is the midpoint of the course. Elective. S. Kimes. Revenue management is a method for profit maximization. The objective of this course is to help students learn how to apply the principles of revenue management to restaurants. The course focuses on methods of managing duration and price with the operation of microcomputer-based spreadsheet programs. Topics covered include forecasting, overbooking, reservations systems, information technology, process design, pricing, and management and marketing issues.

H ADM 609 Airline Service Management
Spring. 3 credits. Preference is given to 30 seniors and graduate students; others may enroll, space permitting. The cost of the field trip is approximately $75. Elective. M. Tabacchi. A must for those who are interested in careers in the airlines industry. The impact of 9/11 upon the industry will be investigated. Airline service and on-board services are used as competitive advantages by airline carriers. In fact, names such as Singapore Airlines and Virgin Atlantic have become synonymous with service excellence in a service economy. The strategies of developing competitive and superior service in today's erratic economic climate will be a major part of class discussion. Guest speakers from American Airlines, Singapore Airlines, US Airways, Delta, Continental Airlines, Virgin Atlantic, and SkyChefs will be featured. In addition to service strategies both on the ground and in the air, students will study the challenge of serving meals on international flights. Strategies, planning, and forecasting by these executives will be examined. Case studies based upon national and international airline business will be 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.

H ADM 701 Quantitative Methods
Fall. 3 credits. Open to M.M.H. students only, except by written permission of the instructor in advance of preenrollment. M.M.H. requirement. Faculty. Covers statistical and operations research techniques that can be applied to the hospitality industry. Topics covered include descriptive statistics, probability, sampling, correlation and regression, forecasting, and yield management. The emphasis is on hands-on application to hospitality problems.

H ADM 702 Food and Beverage Management
Spring. 3 credits. Open to M.M.H. students only, except by written permission of the instructor in advance of preenrollment. M.M.H. requirement. Faculty. Focuses on the technical, managerial, and human resource skills needed to be successful in foodservice management. Topics such as market-based analysis, concept development, menu planning, operations management, and customer service are addressed in a seminar format. Current and future issues affecting the foodservice industry are discussed.

Facilities Management, Planning, and Design

H ADM 255 Hospitality Development and Planning
Fall, spring. 3 credits. Limited to 20 students per section. Limited to sophomores, juniors, and seniors. Required. S. Robson. An introduction to the basic concepts of foodservice facilities design and planning with an emphasis on restaurants. Students determine space allocations for the hotel and back of house areas, develop production workflow in the preparation and service areas, and select equipment using standards for production capacity, quality of construction, and the case of spares. The course includes menu planning, operations management, and consulting. All documentation is produced on CAD, which is taught as part of the weekly studio. Students also use studio time for planning, designing, and writing specifications for a medium-size restaurant kitchen.

H ADM 351 Hospitality Facilities Design
Fall. 4 credits. Prerequisite: H ADM 251 or H ADM 751, or permission of instructor. Limited to 36 students. Elective. R. Penner. This intensive studio course provides the students with the design skills important for design, and experience in applying these skills in hospitality planning and design situations. Students will prepare design projects using hand drafting and computer-aided design (CAD) software. These assignments cover basic graphic skills and layouts for typical hotel spaces including guestroom suite, lobby and lobby bar, and full-service restaurant or specialty coffee retail outlet.

H ADM 352 Hotel Planning and Interior Design
Spring. 3 credits. Prerequisites: H ADM 351 or permission of instructor. Limited to 24 students. The course includes a required field trip at a minimum cost of $250 and the purchase of presentation materials at a minimum cost of $150. Elective. Not offered 2004-2005. Helps students understand how to manage the design process—how to establish the scope of work, contracts, and budgets. Builds on earlier classes to give students experience in planning and designing guestrooms, lobby, food and beverage, function, and fitness spaces. The studio course focuses on a term-long project, in which student teams prepare the interior design for an actual hotel development. The class will visit a northeastern city, tour the project site and competitive hotels, meet with an architect or designer, and establish an integrated concept for the hotel. Students will design all the main interior spaces, modifying the architectural plan as necessary, lay out furniture and fixtures, select finishes and FF&E, and prepare a full design presentation.

H ADM 353 Foodservice Facilities Design
Spring. 3 credits. Prerequisites: H ADM 351 and H ADM 305 (cosegregation or other commercial food production experience is acceptable in or permission of the instructor). Limited to 12 students in each section. Elective. S. Robson. An introduction to the basic concepts of foodservice facilities design and planning with an emphasis on restaurants. Students determine space allocations for the hotel and back of house areas, develop production workflow in the preparation and service areas, and select equipment using standards for production capacity, quality of construction, and the case of spares. The course includes menu planning, operations management, and consulting. All documentation is produced on CAD, which is taught as part of the weekly studio. Students also use studio time for planning, designing, and writing specifications for a medium-size restaurant kitchen.

H ADM 354 Computer-Aided Design
Fall, spring. 3 credits. Attendance at first class meeting is mandatory. Some computer experience is highly recommended. Prerequisite: H ADM 351 or equivalent studio experience. Limited to 24 students per course. Using AutoCAD on the PC, the course presents an organized and logical sequence of commands, mode settings, drawing aids, and other characteristics of CAD. Students spend time learning the program in the school's computing center and develop a complete graphic presentation. Emphasis is placed on the use and operation of CAD systems in a commercial document production environment.

H ADM 355 Hospitality Facilities Operations
Fall. 3 credits. Prerequisite: H ADM 351. Limited to 18 students per section. Required. D. Stipanuk.
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 considered.

[H ADM 452 Sustainable Development and the Global Hospitality Industry]
Fall. 3 credits. Limited to juniors, seniors, and graduate students. An overnight field trip is required. Cost for lodging and transportation estimated at $100, meals are additional. Elective.

A multi-dimensional course introducing the global sustainability and environmental movements, their impact on the hospitality industry, and responses to and opportunities associated with sustainability. Readings are drawn from the environmental, sustainability, and hospitality literature. Students should be prepared to encounter conflicting views in the readings and in classroom discussions. The course attempts to portray a variety of viewpoints regarding issues of contemporary interest to society and the business community. Discussion of these issues is a key component of the course.

H ADM 454 Advanced Computer-Aided Design and 3-D Visualization
Spring. 3 credits. Prerequisite: H ADM 345 or an equivalent introductory AutoCAD course. Limited to 24 students. Elective.

Computer-aided design has grown beyond its traditional use as a tool to draw contract documents. This course gives students an understanding of the more advanced capabilities of AutoCAD as they apply to 3D surface and solid modeling. This course also explores the use of 3D Studio VIZ, a 3D modeling and animation program from Autodesk, in creating 3D models that can be used to produce realistic renderings and animations. Course material is learned by completing weekly project assignments and a final project.

H ADM 457 Hotel Development
Fall. 3 credits. Limited to juniors with permission and graduate students. An overnight field trip is required. Cost for lodging and transportation is estimated at $100, meals are additional. Elective.

Focus on the management structure and systems, laws and regulations, and industry practices that most influence the successful development of hospitality real estate, including lodging and eating facilities. Topics include: franchise requirements, governmental approvals, design construction contracts, the construction process, scheduling, budgeting, and emerging issues and opportunities. Guest speakers present case studies of actual development projects.

H ADM 459 International Hotel Development
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Elective.

The seminar course includes discussion of corporate expansion strategies, the international development process, viewpoints of different stakeholders, and development challenges such as technology, infrastructure, environmental concerns, and public policy issues. Students research a variety of international hotel development and the strategies of emerging management companies. Guest lecturers will present and discuss new projects in Europe, the Middle East, South America, and Asia and contrast these opportunities to development in the United States.

H ADM 553 Restaurant Development
Fall. 3 credits. Limited to seniors and graduate students. Prerequisite: H ADM 345. Students have the opportunity to enroll in H ADM 553.

A seminar course includes discussion of franchise development, the development of a restaurant concept, and the process of opening a new restaurant. Topics include: feasibility, site selection, facility programming, and development issues such as licensing, permitting, and construction. Visitors from the industry will address best practices and their own experiences in getting a restaurant concept off the ground. The course includes readings, discussions with industry leaders, and cases, and culminates with students formulating a detailed restaurant concept and development plan.

H ADM 751 Properties Development and Planning
Spring. 3 credits. Open to M.M.H. students only, except by permission of the instructor in advance of preenrollment. Limited 30 students per section. M.M.H. requirement. Elective.

A seven-week course is the midpoint of the semester. Special emphasis will be placed on what each method should and should not be used for and why.

H ADM 243 Marketing Management for Services
Fall. Spring. 3 credits. Limited to 60 hotel school students per lecture, not open to freshmen. Required. L. Klein Pearo.

Develops an understanding of marketing management, the process through which organizations analyze, plan, implement, and control programs to develop and maintain beneficial exchanges with target buyers. Students will learn about marketing management through a mix of readings, lectures, class discussions, and group exercises, industry guest speakers, and exams. A key element of the course involves working as part of a small team to complete a marketing plan for a business organization. The plan provides a road map of an organization's future marketing strategies and products.

H ADM 340 Franchising in the Hospitality Industry
Fall. 2 credits. Not open to freshmen. Offered during the second seven weeks of the semester. Note: the deadline to drop a seven-week course is the midpoint of the course. Elective.

H ADM 343 Marketing Research
Fall. 3 credits. Prerequisite: H ADM 243.

H ADM 344 Tourism I
Fall. 2 credits. Not open to freshmen. Offered during the second seven weeks of the semester. Note: the deadline to drop a seven-week course is the midpoint of the course. Elective.

H ADM 345 Hospitality Sales
Fall. 3 credits. Prerequisite: H ADM 243.

H ADM 414 Microeconomics for the Service Industry
Fall. Spring. 3 credits. Limited to 60 hotel school students per lecture. Required.

Introduces students to microeconomic principles and theories in the context of applications and solutions associated with the service industry, with a focus on hospitality and travel. Topics include principles of production, supply and demand, firm behavior, costs, pricing and topics specifically associated with the travel and hospitality industry. Includes discussions, problem sets, and guest speakers.

MARKETING, TOURISM, STRATEGY, AND INFORMATION SYSTEMS

Marketing, Tourism, and Strategy
H ADM 414 Microeconomics for the Service Industry
Fall. Spring. 3 credits. Limited to 60 hotel school students per lecture. Required.

Introduces students to microeconomic principles and theories in the context of applications and solutions associated with the service industry, with a focus on hospitality and travel. Topics include principles of production, supply and demand, firm behavior, costs, pricing and topics specifically associated with the travel and hospitality industry. Includes discussions, problem sets, and guest speakers.
Guest speakers will sometimes serve as the buyers in these role-plays. Students will be required to critique the role-play performances of classmates, develop written sales presentations, and shadow a professional salesperson.

H ADM 347 Consumer Behavior
Fall, spring, 3 credits. Prerequisite: H ADM 243. Limited to 45 juniors and seniors. Elective. M. Lynn.

Helps students become better at understanding, predicting, and influencing consumer behavior. Topics include motivation, perception, learning, decision making, attitudes, non-verbal communication, persuasion, compliance, geodemographics, and psychographics. The practical implications of psychological principles will be emphasized. Specific applications will involve such areas as guest frequency programs, menu design, promotional strategy, personal selling, sales and marketing planning, and marketing research. Class time will be used for discussions and application exercises as well as for the presentation of relevant information.

H ADM 441 Strategic Management
Fall, spring, 3 credits. Prerequisites: at least one course in each of accounting, finance, marketing, operations, economics, and information systems. Limited to seniors. Because students will work in groups in the course, the absolute drop deadlines are September 11 (fall) and January 10 (spring). Required. C. Enz.

Students will learn to evaluate firms, industries, and the broader environments in which they exist. Since this is a capstone course, a part of the analysis process will involve the students to use and applying the various tools learned in all of the functional disciplines. Students will also evaluate specific firm strategies and their impact on competitiveness and performance. Using all of this information, students will be trained to select strategies for firms and develop plans for implementing them. Topics include environmental analysis, firm resource analysis, competitive analysis, strategy formulation, strategy implementation, international strategy, and strategic control.

H ADM 442 Strategic Marketing
Fall, 3 credits. Prerequisite: a previous marketing course. Limited to seniors. Elective. C. Dev.

Offers innovative, practical, and profitable knowledge and insights to improve revenue, profit, and customer loyalty. Concepts include underlying strategic marketing, best-practice examples, and challenges facing hospitality brands. The unique benefits of this course come from the extensive use of detailed case studies, lectures, discussion, and industry guest lecturers. Students will be trained to select strategies for firms and develop plans for implementing them. Topics include environmental analysis, firm resource analysis, competitive analysis, strategy formulation, strategy implementation, international strategy, and strategic control.

H ADM 4447 Managing Hospitality Distribution Strategies
Spring, 3 credits. Prerequisites: H ADM 141 and H ADM 243. Elective. R. Carrell.

Provides a framework for managing marketing distribution strategies. Present and analyzes the structure and interrelationships among distribution channels within the travel and hospitality industry. Also stresses the role of marketing distribution and management and analysis are evaluated and applied within the context of that system. Topics include dimensions of hospitality marketing distribution, economics of the major hospitality distribution segments, managing hospitality distribution strategies, and the role of convention and visitors bureaus, national旅游 organizations, and associations in distribution management.

H ADM 448 Marketing Communications
Spring, 3 credits. Prerequisite: a previous marketing course. Seniors only. Elective. C. Enz.

Applied perspective on correctly managing communication programs for brands in the hospitality industry. Topics include advertising, promotion, direct marketing, public relations, and social media. Key elements of marketing communications and how to use them effectively and efficiently will be covered. Topics will include case studies and examination of best and worst examples. Learning will be assessed and applied through written and oral presentations, and a written report.

H ADM 449 Innovation and Dynamic Management
Spring, 3 credits. Limited to 15 seniors and graduate students. Elective. C. Enz.

A seminar approach will be used to discuss case studies and selected to illustrate current challenges and future trends, such as globalization and consolidation in the hospitality industry. Topics will be presented by experts from the hospitality industry. The view will be futurist and primarily from that of a multihospitality industry. Theories and concepts that draw on customer, competitor, and core capability analyses in marketing and distribution management, with applications in the hospitality industries, will be examined. Development of decision-making capabilities in the various functional areas of marketing, including product, price, promotions, and distribution policies. Topics include evaluating market opportunities, generating feasible alternatives, selecting appropriate systems for choosing among alternatives, and deriving actionable implementation plans.

H ADM 740 Competitive Strategies for the Hospitality Industry
Fall, 3 credits. Open to M.M.H. students only, or permission of the instructor. M.M.H. requirement. H. Enz.

Provides students with an understanding of the basic concepts of marketing management and experience with the techniques, analyses, and frameworks necessary for solving marketing management problems. Theories and concepts that draw on customer, competitor, and core capability analyses in marketing and distribution management, with applications in the hospitality industries, will be examined. Development of decision-making capabilities in the various functional areas of marketing, including product, price, promotions, and distribution policies. Topics include evaluating market opportunities, generating feasible alternatives, selecting appropriate systems for choosing among alternatives, and deriving actionable implementation plans.

H ADM 741 Marketing Management for Services

Provides students with an understanding of the basic concepts of marketing management and experience with the techniques, analyses, and frameworks necessary for solving marketing management problems. Theories and concepts that draw on customer, competitor, and core capability analyses in marketing and distribution management, with applications in the hospitality industries, will be examined. Development of decision-making capabilities in the various functional areas of marketing, including product, price, promotions, and distribution policies. Topics include evaluating market opportunities, generating feasible alternatives, selecting appropriate systems for choosing among alternatives, and deriving actionable implementation plans.

H ADM 742 Strategic Marketing
Fall, 3 credits. Prerequisites: a previous graduate marketing course and permission of the instructor. Limited to graduate students. Elective. C. Dev.

For description, see H ADM 442.

H ADM 745 Services Marketing
Fall, 3 credits. Prerequisite: a previous marketing course or permission of the instructor. Limited to graduate students. Elective. R. Kwotnik.

The main course goal is to develop critical analytic skills and knowledge needed to implement service strategies for competitive advantage. Topics include key differences in goods vs. services marketing and service gaps analysis, services consumer behavior and satisfaction, service quality, relationship marketing, service recovery, service design (including analysis of service as theater), service blueprinting and the "service scape," and services operations, including service operations, pricing, promotion, and distribution. Lectures, discussion of current services research, case analyses, and guest-speaker presentations. Also used will be a variety of group and individual written projects and presentations including a services-marketing audit.

H ADM 746 Creating and Managing for Service Excellence
Fall, 3 credits. Open to M.M.H. students only, except by written permission of the instructor in advance of precertification. M.M.H. requirement. R. Kwortnik.

How do you maintain profitability in an increasingly competitive environment? One approach is to manage for value, deliver the quality level the customer is willing to pay for, and produce it at a cost that allows a firm to prosper. This course covers the concepts, complexity, and management practices necessary to deliver consistent value in the hospitality industry (determining customer expectations, integrating marketing into operations, managing customer satisfaction, and measuring and controlling costs). Case studies, lectures, discussion, and industry experts are used, but the emphasis is on
translating the strategic understanding of value into management practice.

Information Systems

H ADM 174 Microcomputing
Fall, spring. 3 credits. Limited to hotel school freshmen and transfer students in the fall. Open enrollment in the spring. Limited to 30 students per section. Required. P. Clark, M. McCarthy, M. Talbert.
Provides a foundation in information technology (IT) and how it relates to every day business computing. Teaches IT concepts during lectures and reinforces these concepts in practical lab sessions using current standards of business computing. Topics include fundamental IT concepts, proficiency in Microsoft Office, and understanding the issues of tool selection, standardization, and efficiency. Integration of applications, and recognizing the importance of good computer management.

H ADM 274 Microcomputing
Spring. 3 credits. Limited to 30 non-hotel school students per lecture. Elective. P. Clark.
An introduction to business computing to develop functional computer fluency. Students develop skills in the areas of text, spreadsheets, presentation and file management, and web site management. The course is entirely lab-oriented and students work using Windows 2000. Software used is the latest in word processing, spreadsheet presentation, database management, and web design.

H ADM 275 Introduction to Information Systems Management
Fall, spring. 3 credits. Prerequisite: H ADM 174. Limited to hotel school students. Required. G. Piccoli, E. Wagner.
Goals of the course are to learn about information systems, understand and be able to clearly articulate the difference between information technology and information systems; to link concepts and technical jargon to the real-world uses of information systems; and to learn the information systems fundamentals needed throughout hospitality careers. Designed for students who will work within hospitality organizations as end users, user-management professionals, and information systems professionals. This is not a course for technologists, but rather for the general-management student. Provides the essential information that all hospitality-management students should know about information systems.

H ADM 374 Fundamentals of Database Management and Data Analysis
Fall. 3 credits. Limited to 30 students. Elective. E. Wagner.
Prepares students to create and manage information in a knowledge-based organization. The course design and use of database and spreadsheet functionality will be used to perform analyses and make decisions. Students will gain a conceptual foundation and then practice applying these ideas through project activities and course readings. Topics include information and management in organizations; fundamentals of relational database design and implementation; SQL queries; how to work in a database design team and as an individual research analyst, database design and management using Microsoft Access; how to normalize a database design to ensure effective use of the technology; analysis of the managerial decision-making process functionality within Microsoft Access and Excel; the conversion of data into information and knowledge that can be leveraged for particular business goals; the role of data and information management in contemporary society and data management opportunities in the hospitality industry.

H ADM 475 Information Technology for Hospitality Managers
Fall, spring. 3 credits. Limited to hotel school students. Prerequisite: H ADM 175. Required for students who matriculated prior to fall of 2003. G. Piccoli, E. Wagner.
What is the difference between information technology (IT) and information systems (IS) and why should user-managers know about IS? How can we make sense of all the business information systems available today? How is IT purchased and developed by the hospitality organization—what will your role in that process be and what do you need to know to be an asset to the system-selection or design team? How do these concepts inform electronic commerce, and the building of intranets and extranets? How are IS built, acquired, managed, and safeguarded? And how is your understanding of IS going to help you in your chosen career track?
We have three main goals in this course: 1) to learn about IS, understand and be able to articulate the difference between IT and IS; 2) to link concepts and technical jargon to the real-world uses of IS; 3) to learn the IS fundamentals you will need throughout your hospitality careers.

H ADM 476 Visual Basic for Applications: End-user Programming
Fall, spring 3 credits. Limited to 30 students per lecture. Elective. Note: due to capacity restraints in the Binenkorb lab, the following restrictions apply: attendance at the first class meeting is mandatory; no-show students will be dropped from the course to make room for stand-by students; students may not drop the course after the second week of class. M. Talbert.
This is an introductory programming course for end-users (e.g., 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.

H ADM 477 Advanced Business Modeling
Fall, spring. 2 credits. Second seven weeks of the semester. Note: the deadline to drop a seven-week course is the midpoint of the course. Limited to 21 seniors and graduate students. Preference given to M.M.H. students. Prerequisite: H ADM 174. M. McCarthy, M. Talbert.
This course is focused on organizational systems, planning, and decision process, and how information is used for decision support in organizations. The course provides students with practical skills in developing spreadsheet computer models using Microsoft Excel.

H ADM 574 Strategic Information Systems
Spring. 3 credits. Elective. G. Piccoli.
This course is targeted to those students contemplating careers in general management and operations, marketing, or information systems. Managerial in nature, the course is designed to help students think strategically about IT (and, by extension, about any organizational resource) and provides students with analytical tools that can help them make effective decisions about the use (or not) of IT in organizations. Students learn the managerial implications of recent technology trends, the economic premises of the new competitive landscape dominated by pervasive networking (e.g., the Internet), how information technologies can be leveraged to create shareholder value and service customers, how information and advanced IT can create competitive advantage, and when and how a competitive advantage is based on IT can be sustained. Course includes lectures, case study discussions, guest presentations, and project work. Many of the class activities center on analysis and discussion of readings and cases. Class meetings are very interactive.

H ADM 575 Internet Technologies
Spring. 3 credits. Prerequisite: H ADM 174 or equivalent. Elective. Note: due to capacity restraints in the Binenkorb lab, the following restrictions apply: attendance at the first class meeting is mandatory; no-show students will be dropped from the course to make room for stand-by students; students may not drop the course after the second week of class. M. Talbert.
Introduces students to the technical underpinnings of the Internet, with an emphasis on the World Wide Web. Students survey many of the key technologies that form the mechanism of the Web, including HTML, DHTML, XML, JavaScript, VBScript, Java, Style Sheets, Browsers, Servers, ActiveX, and Active Server Pages. The goal is a managerial familiarity with a broad range of important technologies, rather than proficiency in any single technology. This is an implementation course; in other words, programming is covered. Students should expect a considerable demand on outside time for practice necessary to gain programming fluency in the languages introduced.

H ADM 772 Information Technology for Hospitality Managers
Fall. 3 credits. M.M.H. requirement. Open to M.M.H. students, others by written permission of the instructor. G. Piccoli.
This course takes a managerial approach and focuses on the concepts and terminology that functional and general managers must command to be effective and competent users of the information systems (IS) resource. Students will have the opportunity to learn about the following: the concept of IS and its component parts; the fundamentals of information technology, including appropriate language and fundamental concepts; the major hospitality-specific information systems and enterprise information systems, as well as their appropriate deployment and management; the systems development and
selection process, and IS resource assessments, planning, and management. This course assumes no IT-specific knowledge and aims at building such a knowledge base. Lectures, case-study discussions, guest presentations, and project work will be used to accomplish the course objectives and to evaluate students’ understanding of the concepts and analytical techniques covered.

FINANCE AND REAL ESTATE

Finance/Accounting

H ADM 120 Personal Financial Management
Fall, spring. 2 credits. Limited to 50 non-hotel school students. Elective. L. Hensley, E. Cornell.
An overview of personal financial planning including money management, tax planning, use of credit, insurance, investing, retirement planning, and estate planning.

H ADM 121 Financial Accounting
Fall, spring. 3 credits. Limited to hotel school students. Required. D. Dittman.
An introduction to the basic principles of accounting, involving transaction analysis, flow of accountability to the financial statements, and careful consideration of accounting for revenues, expenses, assets, liabilities, and owner’s equity.

H ADM 122 Financial Accounting Principles
Fall, spring. 3 credits. Limited to non-hotel school students. Elective. P. Strebel, D. Dittman.
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.

H ADM 125 Finance
Fall, spring. 3 credits. Limited to undergraduate non-hotel school students only. Elective. S. Gibson, L. Canina.
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.

H ADM 211 Managerial Accounting
Fall. 3 credits. Prerequisites: H ADM 121 and H ADM 174, or equivalents. Required. Faculty.
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 is one common exam at the end of the semester.

H ADM 222 Finance
Spring. 3 credits. Prerequisites: H ADM 121, H ADM 221, or equivalents, or permission of instructor. Limited to hotel school students, others by permission. Required. S. Carvell.
Provides students with accounting cash flow information for financial planning, capital structure decisions, capital budgeting evaluation, and short-term and long-term financial decision-making. Topics include current asset management, short-term financing, capital budgeting, long-term financing, cost of capital, and problems in international finance.

H ADM 321 Hospitality Financial Management
Fall, spring. 3 credits. Prerequisites: H ADM 121, or H ADM 221, and H ADM 222, or permission of instructor. Each section limited to 54 hotel school students. Required. A. N. Geller.
Integrates the areas of financial accounting, managerial accounting, and finance, and applies the interpretive and analytical skills of each to hospitality industry situations. Course topics provide an understanding of the analysis and interpretation of financial statements and operating reports, the budgeting and forecasting process, the application of C-V-P and other decision models to hospitality operations, operating agreements, capital investment analysis, financial feasibility, project and general financing, valuation techniques, and measuring value for important stakeholders.

H ADM 322 Principles of Investment Management
Fall, spring. 3 credits. Prerequisites: H ADM 125 or H ADM 222. Limited to non-hotel school students. Students with background in economics, quantitative analysis, and computers are advised to consider H ADM 424, Security Analysis and Portfolio Management. Elective. C. Chang.
Covers basic institutional and analytical aspects of investment management. Topics include: financial markets, sources of investment information, risk-return analysis, bond and stock valuation, behavior of security prices, portfolio analysis and portfolio management, and mutual fund investment. While newcomers to investment management commonly believe that investing is about how to make money in the markets, this course instead focuses on identifying and managing to reasonable and feasible investment objectives in general and in today’s highly competitive investment markets. To that end, students are required to apply concepts and tools to managing a simulated investment portfolio (the Investment Management Game) during the course of the semester.

H ADM 326 Corporate Finance
Fall. 3 credits. Prerequisite: H ADM 321. Limited to juniors and seniors. Elective. S. Gibson.
Course provides in-depth analysis of corporate financial management, including: financing alternatives and capital structure decisions, cash management and working capital management, capital budgeting decisions, risk analysis, valuations of real options, and Economic Value Added analysis. Although applicable to all businesses, special attention is placed on issues important to the hospitality industry. The course emphasizes analytical methods through case studies and a semester project.

H ADM 421 Internal Control in Hospitality Operations
Spring. 3 credits. Prerequisites: H ADM 321, H ADM 722, or equivalent. Limited to 50 students. Elective. A. N. Geller.
Deals primarily with operations. Generally, hotel and restaurant operations are analyzed from the perspective of preventing fraud and embezzlement. Specifically, the design and distribution of production, accounting, information systems, and supervisory tasks are studied in a manner that ensures effective internal control and verifiable audit trails. The course relies heavily on case studies of actual frauds perpetrated in hotel and restaurant operations.

H ADM 422 Taxation and Management Decisions
Fall. 3 credits. Limited to 75 juniors, seniors, and graduate students. Elective. A. Sciarabba.
An introduction to tax advantages and disadvantages of various organizational structures, including: corporations, partnerships, subchapter “S” corporations; financial information reporting to tax authorities; and to share how exactly how these reports differ; use of depreciation methods to achieve tax reductions; and syndication techniques and the role tax laws play in promoting private investments and development.

H ADM 622 Capital Investment Analysis
Spring. 3 credits. Prerequisite: a course in principles of corporate finance for graduate students, H ADM 721, Financial Economics, or its equivalent, for undergraduate students, H ADM 222 and permission. Elective. L. Canina.
Covers how financial managers must make capital investment decisions to maximize shareholder wealth. This requires an in-depth understanding of both the investing and financing decision-making process. To understand the former, students learn about the capital budgeting process and acquire specific skills enabling them to evaluate capital projects; e.g., net present value, discounted cash flow, and risk analysis. For the latter, students learn about the capital structure and how the firm’s cost of capital and capital structure are linked with shareholder wealth maximization. Case studies are used to illustrate theory, and industry guest speakers conduct occasional seminars.

H ADM 624 Reporting and Analysis of Financial Statements
Fall, spring. 3 credits. Limited to 60 juniors, seniors and graduate students. Elective. G. Potter.
Designed to provide 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 implication of using alternate accounting rules on the resulting numbers, especially in assessing the “earnings quality.” Focus is from an outsider’s view of the company, and students should be able to both analyze and interpret the published financial information, specifically in the context of valuation, debt and compensation contracts, and credit assessment.

H ADM 721 Financial Economics
Fall. 3 credits. Open to M.M.H. students only, except by written permission of the instructor in advance of the pre-enrollment M.M.H. requirement. L. Canina.
Integrates corporate finance with the framework of value maximization and the competitive analysis of product and factor markets in the hospitality industry. Topics include short-term asset management, strategic valuation, capital budgeting analysis, capital
structure decisions, leasing, and international financial management.

H ADM 722 Hospitality Financial Management
Spring. 3 credits. Open to M.M.H. students only, except by written permission of the instructor in advance of preenrollment. M.M.H. requirement. G. Potter. Covers both managerial accounting and financial management as they are practiced in the hospitality industry. Topics include hospitality accounting systems, financial analysis, operational analysis, cost behavior, budgeting and forecasting, pricing, and feasibility analysis.

Real Estate Development

H ADM 323 Hospitality Real Estate Finance
Fall. 3 credits. Prerequisite: H ADM 321 or equivalent. Limited to juniors and seniors (graduate students must enroll in H ADM 621). Elective. D. Quan. Focuses on real estate financing for hospitality-oriented projects. The following topics are addressed: methods of measuring rates of return; feasibility and appraisal processes; equity and debt financing vehicles to include joint ventures; limited partnerships, construction mortgages, participating, convertible and seller-financed mortgages; forms of operating agreements to include management contracts, leases, and franchises; and trends in international hotel franchising. Presentations by hospitality industry real estate practitioners tie course material to current industry practices.

H ADM 420 Principles of Real Estate
Spring. 3 credits. Offered during summer session most years as H ADM 420/620. Prerequisite: H ADM 222 or equivalent. Limited to 50 juniors and seniors (graduate students must enroll in H ADM 620). Elective. J. Corgel. This survey course approaches real estate from four perspectives: investment, market, mortgage finance, and legal. Understanding these perspectives enable students to make better investment and financing 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.

H ADM 620 Principles of Real Estate
Fall. 3 credits. Offered during summer session most years as H ADM 420/620. Prerequisite: H ADM 721 or equivalent. Limited to graduate students. Elective. J. Corgel. For description, see H ADM 420. This course includes much of the material in H ADM 450 plus special topic sessions that feature guest speakers from industry, faculty from other colleges, and case studies.

H ADM 621 Hospitality Real Estate Finance
Fall. 3 credits. Prerequisite: H ADM 722 or equivalent. Limited to graduate students. Elective. D. Quan. Focuses on real estate financing for hotel and restaurant properties. Methods of measuring rates of return; feasibility and appraisal processes; equity and debt financing vehicles to include participating, convertible, and seller-financed mortgages; forms of operating agreements to include management contracts, leases, and franchises; and trends in international hotel financing. Presentations by hospitality industry real estate practitioners tie course material to current industry practices.

H ADM 625 Securitization and Structured Financial Products
Spring. 3 credits. Prerequisites: H ADM 222 or H ADM 721, and H ADM 427 (or by permission of the instructor). Limited to 40 seniors and graduate students. Elective. D. Quan. 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 this course of analysis of such securities (such as collateralized mortgage obligations, commercial MBS, auto loan, 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. If you have any questions about your preparation or background, please see the instructor.

H ADM 620 Real Estate Finance and Investments
Spring. 3 credits. Prerequisites: H ADM 323 or H ADM 621, H ADM 450 or H ADM 651. Limited to 40 graduate students. Elective: J. Corgel. Promotes sound real estate investment and finance decision-making, 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 models 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 extensively covered. All types of residential and non-residential real estate are analyzed, including hospitality properties.

H ADM 490 Housing and Feeding the Homeless
Spring. Variable credit. Elective. T. O'Connor. Explores public and private sector approaches to addressing hunger 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 the homeless. Students study the history of 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 around community work experience. Students must choose one of the following options: a) 4 credits. Students work in pairs or small groups with a local area agency that provides services for homeless or disadvantaged people. They analyze the agency's mission and goals, identify managerial challenges, and formulate an approach in the form of product or service that is useful to the agency. This field practicum comprises approximately 60 credits of work during this semester, half of which will be in direct contact with the agency and its clients. b) 4 credits. Students participate in an alternative spring break in an agency(ies) in Washington, D.C. or New York City. Students work five full days in an agency that serves homeless, hungry, incarcerated, or disenfranchised people, such as homeless shelters, community kitchens, or battered women's housing units. Housing and transportation are arranged. This option may cost students up to $100. Students interested in this option must see the instructor at pre-registration time. c) 3 credits. Students do community work in the Ithaca area with an agency that serves homeless, hungry, incarcerated, or disenfranchised people. Students work on a regular weekly basis for a minimum of 30 credits during this semester.

H ADM 491 Hotel Ezra Cornell (H.E.C.)
Fall and spring. Variable. 1-2 credits in the fall and 3-4 credits in the spring). Elective. Limited to hotel school juniors, seniors, and second-year M.M.H. students. Prerequisite: permission of the instructor. Students selected by the hotel board and the Hotel Ezra Cornell (H.E.C.) may receive up to 3 credits in hotel electives for their participation in the planning, organizing, staffing, directing, and controlling of H.E.C.'s operation. Additional credit would be in free electives only. Next year's board will continue to implement the business plan that was developed by the previous H.E.C. board of directors. "To establish Hotel Ezra Cornell as the premier forum to deliver a unique hospitality learning experience to industry leaders and students in an interactive setting." Board positions are limited to students in standing with a minimum cumulative G.P.A. of 2.5. Eligibility requirements for specific board positions can be obtained in the student services office, room 178, Statler Hall. Eligible students who are considering a board position for H.E.C. should contact the board chair for the course and speak with the instructor; final enrollment is determined by an election process. A field trip to New York City during the hotel show in November is a required course activity; the cost is estimated at $200.

H ADM 290 Introduction to Culinary Arts
Fall, spring. 2 credits. Limited to 28 non-hotel school students; priority is given to seniors and graduate students. The course fee of $75 includes the cost of a uniform and uniform cleaning. Note: preregistered students who do not attend the first class are automatically dropped from the course. The instructor may permit drop-ins to attend other classes. The course activity; the cost is estimated at $200. A field trip to New York City during the hotel show in November is a required course activity; the cost is estimated at $200.
H ADM 493 Management Intern Program –Operations
Fall, spring. 6 credits. Prerequisites: students are expected to have completed the following courses: H ADM 105 or 115, 201, 211, 121, 222, 225, 255, 165, 174, and 275. In addition, completion of the following courses is strongly recommended: H ADM 321, 305, 355, and 365. Additional course work may be required for applicants considering specialized internships. A detailed plan for the completion of all remaining academic requirements must be submitted prior to acceptance into the course. Elective.
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 H ADM 493 and 494. Students enrolled in H ADM 493 receive academic credit in free electives as well as practical experience in the hospitality field. Six performance evaluations are used to determine this grade. Students must be in good academic standing and have a GPA of at least 2.0 in the preceding term. Further information is available in the career services office, 255 Statler Hall.

H ADM 497 H ADM 494 Management Intern Program II—Academic
Fall, spring. 6 credits. Elective. 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 H ADM 493 and 494. Students enrolled in H ADM 493 receive academic credit in free electives for submission of a goals and objectives statement, four management reports, six journal entries which focus on insights gained through analysis of events occurring in the workplace, and four Hospitality Management Checklist summaries. Upon return to campus, each intern completes a debriefing and an oral presentation to fulfill the academic requirements. Students must be in good academic standing and have a GPA of at least 2.0 in the preceding term. Further information is available in the career services office, 255 Statler Hall.

H ADM 495 Implementing Strategies for Tying Wellness Practices to Company Profit
Spring. 3 credits. Preference is given to juniors, seniors, and graduate students; others may enroll with departmental permission. Elective. M. Tabachnick.
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 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 officers 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.

H ADM 498 Undergraduate Independent Study
Fall, spring. Variable credits. Elective. Faculty.
Can only be taken if conducting two independent studies in one semester.

H ADM 499 Undergraduate Independent Study
Fall, spring. Variable credits. Elective. Faculty.
Students have the option of conducting an independent study project in any academic area. The number of credits for which students may register are arranged on an individual basis. Note that students convoking themselves to a certain number of credits of independent academic work per week per credit hour if they choose to do an independent study project, and the work must be performed in the term for which the student is enrolled in the independent study. The usual add/drop policy applies, and retroactive credit for work commenced after an academic term has ended is not allowed. Projects are conducted under the direction of a faculty member, and regular, frequent consultations are mandatory. Also, a written report must be produced and made available to all faculty members and students of the school after its submission to the supervising faculty member. Credit for independent study projects may not count toward the hotel school elective requirement, but, rather, toward free electives. Students cannot earn academic credit for independent study when the equivalent material is offered in a regular course, and credit is not earned for teaching a course. Students should consider all aspects of their situation before committing themselves to an independent study. Enrollment forms are available in the student services office, 178 Statler Hall.

H ADM 690 Honors Monograph Faculty
Year long. 4 credits. Elective.
Limited to professional master's students who either have a minimum GPA of 3.7 or are in the top 10 percent of the students in the year group in their first-year professional master's courses; have given evidence of being a good writer by meeting all components of the written communication benchmark; and who have obtained approval of a brief topic proposal from the potential advisor. This is a special integrative course for students who write well and desire to explore in depth a topic of mutual interest to them and a faculty advisor of their choice. The approval of a second reader is required for completion of the course. Special recognition of students who complete the course will be made at graduation. Applications are available in the graduate office, room 172, Statler Hall.

H ADM 698 Undergraduate Independent Research
Fall, spring. Elective. 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 prior to course enrollment. Permission forms can be obtained in the hotel school graduate office, room 172, Statler Hall.

H ADM 699 Graduate Independent Research
Spring. 2 credits. Elective. 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 prior to course enrollment. Permission forms can be obtained in the hotel school graduate office, room 172, Statler Hall.

H ADM 793 Industry Mentorship Program
Yearlong. 0 credits. M.M.H. requirement. T. Hinkin.
The five M.M.H. core courses in the spring semester are focused on the completion of an integrated and interdisciplinary project for an industry client. Under this course number, the client, the faculty, and the M.M.H. students accumulate information necessary for the completion of the project and the presentation of the results to the industry client. Although the course is listed as year long, the students and faculty members access the information primarily in the spring semester.

H ADM 890 M.S. Thesis Research
Fall, spring. Required. Faculty.

H ADM 990 Ph.D. Thesis Research
Fall, spring. Required.
Jameson, Daphne A., Ph.D., U. of Illinois.
Assoc. Prof.

Kimes, Sheryl E., Ph.D., U. of Texas. Prof. and
Richard J. and Monene Bradley Director of
Graduate Studies

Kwortnik, Robert, Ph.D., Temple Univ. Asst.
Prof.

Lang, Barbara, B.S., Cornell U. Lecturer
Lennox, David, Ph.D., U. of Washington.
Lecturer

Lloyd, Russell, Ph.D., Cornell U. Sr. Lecturer
Lundberg, Craig C., Ph.D., Cornell U.
Blanchard Professor of Human-Resources
Management

Lynn, Wm. Michael, Ph.D., Ohio State U.
Assoc. Prof.

McCarthy, Mark, M.M.H., Cornell U. Teaching
Support Specialist

McCarthy, Reneta, M.P.S., Cornell U. Lecturer

Mutschler, Stephen A., Ph.D., Cornell U. Banfi
Vintners Professor of Wine Education and
Management

Nash, Abby, B.A., Cornell U. Lecturer

Noone, Breffni, M.B.S., Dublin City U. Asst.
Prof.

Norkus, Gregory X., M.S., Cornell U. Senior
Lecturer

O'Connor, Therese A., M.S., Elmira College.
Senior Lecturer

Prof.

Penner, Richard H., M.S., Cornell U. Prof.
Pezzotti, Giuseppe G. B., M.P.S., Cornell U.
Senior Lecturer

Piccoli, Gabriele, Ph.D., Louisiana State U.
Asst. Prof.

Potter, Gordon S., Ph.D., U. of Wisconsin-
Madison. Assoc. Prof.

Pullman, Madeleine, Ph.D., U. of Utah. Assoc.
Prof.

Quan, Daniel W. C., Ph.D., U. of California,
Berkeley. Assoc. Prof.

Renaghan, Leo M., Ph.D., Pennsylvania State
U. Assoc. Dean for Academic Affairs
Robson, Stephani, M.S., Cornell U. Lecturer

Swerlyn, David, J.D., Cornell U. Asst. Prof.

Siguaw, Judy, D.B.A., Louisiana Technical U.
Assoc. Prof.

Simons, Tony L., Ph.D., Northwestern U.
Assoc. Prof.

Snow, Craig, Ph.D., Purdue U. Senior Lecturer
Spies, Rupert, Studienassessor, Senior Lecturer
Stipanuk, David M., M.S., U. of Wisconsin.
Assoc. Prof.

Sturman, Michael, Ph.D., Cornell U. Assoc.
Prof.

Susskind, Alex, Ph.D., Michigan State U. Asst.
Prof.

Tabacchi, Mary H., Ph.D., Purdue U. Assoc.
Prof.

Talbert, Mark, M.P.S., Cornell U. Lecturer
Thompson, Gary M., Ph.D., Florida State U.
Assoc. Prof. and Executive Director, Center
for Hospitality Research

Tracey, J. Bruce, Ph.D., SUNY Albany. Assoc.
Prof.

Wagner, Erica, Ph.D., London School of
Economics and Political Science. Asst. Prof.

Walsh, Kate, Ph.D., Boston College. Asst. Prof.

White, Robert, A.O.S., Culinary Institute of
America. Teaching Support Specialist
COLLEGE OF HUMAN ECOLOGY

ADMINISTRATION
Lisa Staians-Coico, dean
Jennifer Gerner, associate dean
S. Kay Obendorf, associate dean
Brenda Bonner, director, undergraduate affairs
Darryl Scott, director, admission, student and career services
Joanne LiValle, college registrar

COLLEGE FOCUS
The College of Human Ecology anticipates and responds to human needs in the areas of nutrition and health, economic and social well-being, environmental design and technology; as well as human development through education, basic and applied research, and the extension of knowledge. The college is distinctively characterized by the quality of its research in the natural and social sciences and the design arts, a global perspective in academic programs, a preventive approach to contemporary societal problems, multidisciplinary departments and programs, development of leadership in students and citizens, and a commitment to diverse populations. Faculty and students examine individuals in relation to their family, neighborhood, workplace, and community, seeking a balance between theory and practice that will improve the quality of everyday life.

FACILITIES
The college is housed in Martha Van Rensselaer, Savage and Kinzieberg Halls. The buildings include administrative and faculty offices, classrooms, auditoriums, galleries, and lecture halls; wet chemistry and biochemistry laboratories for nutrition, food science, and textile science; experimental food laboratories; design studios and computer-aided design laboratories; woodworking shops; experimental observation rooms with one-way vision screens and sound-recording equipment; human factors and infant research facilities; and an audio/visual classroom for distance learning. Also included are learning resource centers for career planning, fields of nutrition and health, economic and social well-being, environmental design and technology; as well as human development through education, basic and applied research, and the extension of knowledge. The college is distinctively characterized by the quality of its research in the natural and social sciences and the design arts, a global perspective in academic programs, a preventive approach to contemporary societal problems, multidisciplinary departments and programs, development of leadership in students and citizens, and a commitment to diverse populations. Faculty and students examine individuals in relation to their family, neighborhood, workplace, and community, seeking a balance between theory and practice that will improve the quality of everyday life.

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 Services Administration (M.H.A.), and Doctor of Philosophy (Ph.D.).

GENERAL Academic information concerning the Bachelor of Science degree is given here under the heading "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, Nutrition, Policy Analysis and Management, and Textiles and Apparel). 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
- Human Development
- Human Biology, Health, and Society
- Nutritional Sciences
- Policy Analysis and Management
- Textiles and Apparel
- Individual Curriculum

UNDERGRADUATE AFFAIRS
Persons interested in undergraduate study in human ecology should contact the admission office, 170 Martha Van Rensselaer Hall (255-5471). Those interested in graduate study should contact the graduate field representative identified among the faculty of each department. Department faculty are listed at the beginning of the course descriptions for each department.

Counselors in the Office of Admission, Student, and Career Services (172 MVR) can provide information of interest to mature students. Mature students are permitted to enroll for as few as six credits without petitioning for permission and also are permitted to extend their residency beyond the normal eight terms. 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).

The Student Body
The College of Human Ecology undergraduate enrollment is 1,325. Roughly 400 students graduate each year, last year 205 freshmen and 115 transfer students matriculated. Ninety faculty members serve as advisers to undergraduates.

The college's undergraduate admissions committee selects applicants who are academically well prepared and appear most likely to profit from the college's various curricula. Admission is highly selective. Approximately 10 percent of the student body comes from New York State, with the remainder coming from other parts of the United States and abroad. In 2003, 30 percent were identified as members of minority groups. Approximately 200 graduate students have members of the college's faculty chairing their special committees.

Mature Students
The college recognizes that students who interrupted their formal education and are returning to school have needs different from those of younger undergraduates. To facilitate the education of mature students, defined as those 24 years old or older at first matriculation, the college has adopted certain procedures specifically for that group. Counselors in the Office of Admission, Student, and Career Services (172 MVR) can provide information of interest to mature students. Mature students are permitted to enroll for as few as six credits without petitioning for permission and also are permitted to extend their residency beyond the normal eight terms. 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
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Empire State Students
Occasionally a student who is completing requirements for a degree through the Empire State College Program is interested in taking a human ecology course. This can be done by registering through the Division of Summer Session, Extramural Study, and Related Programs (B20 Day Hall, 255–4987). All rules of the extramural division apply, and registrations will be accepted only on a space-available basis and with the written approval of the course instructor. At the time of registration, Empire State College students must provide the extramural division with a completed copy of Empire State College’s notification of cross-registration form number, SA-22, F-031 to verify enrollment in Empire State College. Such students will be charged 25 percent of the standard extramural tuition per credit.

Transfer Students
Students must 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 will be considered transferable, 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, since rules at the various Cornell colleges often differ. Prior to 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 contact the Office of the Registrar (145 MVR, 255–2235) to discuss how transfer credits will apply to their specific degree program.

MAJORS
The college requires students to fulfill requirements for a major in order 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 Services (172 MVR) 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, 145 MVR. Change of major will trigger re-evaluation of all academic credit and assignment of a new faculty adviser.

DESIGN AND ENVIRONMENTAL ANALYSIS
The Department of Design and Environmental Analysis (DEA) is concerned with planning, designing, and managing interior environments to satisfy human needs. Most people spend over 90 percent of their lives inside buildings. Those settings have substantial and far-reaching effects on the quality of our lives. The processes for creating, managing, and maintaining the built environment face enormous challenges, including frequent organizational changes, technological advances, new building methods, and finite resources. The program in DEA is dedicated to preparing professionals who can meet these challenges.

Diverse faculty backgrounds and teaching approaches help students to develop creative abilities, aesthetic judgment, and analytical thinking. Excellent laboratory, shop, studio, and computer facilities permit exploration of innovative concepts for the design and management of interior environments. 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 professional areas: interior design, facility planning and management, and human factors and ergonomics. The interior design option is accredited by the Foundation for Interior Design Education Research (FIDER). 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 systematic 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 utilize their elective courses to develop a concentration in areas such as design history, historic preservation, hotel and restaurant design, theater design, digital media, design for aging, and design for sustainability.

Careers are available in interior design and space planning, interior architecture, facility planning, interior product design, and housing. This program also serves as an excellent preparation for graduate study in interior design, facility management, architecture, and product design.

Option II: Facility Planning and Management
This option is designed to prepare 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
Human factors and ergonomics focuses on the interaction between people and their physical surroundings. This option 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, life-style, social class, and stage-in-life cycle on environmental needs and requirements is also a focus of the program. Career opportunities are available in 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 adviser during their first semester by the director of undergraduate studies, Jan Jennings, in E219 Martha Van Rensselaer Hall. Consultation with faculty advisers 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 advisers can make recommendations on what to include. Students are free to change
advisers. Although advisers must approve students' schedules during course enrollment each term, 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.

HUMAN BIOLOGY, HEALTH, AND SOCIETY

The Human Biology, Health, and Society (HBHS) Program permits you to combine your interests in the biological sciences while exploring human health issues from the perspectives of both the biological and behavioral sciences. HBHS majors select the issues they want to explore in depth from Human Ecology courses that address health and the role of childhood attachments that influence human well-being. Examples of issues you can explore 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 that develop humans have on their environment. The Human Development major provides an excellent foundation for careers requiring flexible and analytical skills. The Human Development major also allows students to choose one or more areas of particular interest. The flexibility of the major also allows students ample opportunity to meet the requirements for admission to many professional schools, including medical, dental, law, and business schools.

Requirements specified by the College of Human Ecology make up part of each student's curriculum, and include classes in the social and natural sciences, humanities, writing, and communication. In addition, there are requirements for the Human Development major. Students in this major can choose up to 14 elective courses from the broad range of offerings across the Cornell campus.

Special Opportunities
Beyond formal coursework, students have many other opportunities that involve ongoing individual work with Cornell faculty or other professionals. Academic credit can be earned through all of them. 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, senior housing, and the department's on-campus Early Childhood Program. Students have also participated in projects with the Tompkins County Office of Aging, the Tompkins County Youth Bureau, and the Tompkins County Office of Aging.

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, and the study of recent trends in the composition of American families.

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 marital quality in Asian and inter racial couples, development in families that adopt school-age children, connections between the role of children in romantic relationships, and later scores on intelligence tests, and ethnic variation in exposure to stressors in adolescence.

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 Human Development and Wells College. This program requires careful planning and course scheduling. It enables students to graduate with a Cornell Bachelor's Degree and New York State Certification to teach nursery school through sixth grade. This certification is honored by most other states.

The program requires a minimum of a three-semester commitment. Cornell HD students take four courses at Wells College and student teach their last semester at Cornell. Although there is no transportation between Cornell and Wells College, it is important for students to have access to a car, especially while student teaching. Students will be registered at Cornell during the entire undergraduate program and usually maintain Ithaca housing. Wells College courses count as Cornell courses and are used as electives, but do not get 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. You 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 of Nutritional Sciences (NS) focuses on the complex interactions of food patterns, nutritional status, and health. This field draws upon chemistry, biology, and the social sciences to understand questions such as: How are nutrients used by the body? What factors influence human food choice? What nutrients and dietary patterns are recommended to promote growth, maintain health, or reduce the risk of chronic disease? Students in this program may also participate in the Cornell prison apprenticeship program, which allows students to participate in training in dietetics toward registration as a dietitian (R.D.), which will enable them to be employed as nutrition counselors, clinical nutritionists, sports nutritionists, or administrators of food and nutrition services. Students also may prepare for medical school and other types of advanced degree programs through this major. The requirements for this program are outlined in the section of this catalog that describes the division's programs.

Special Opportunities

Dietetics and Clinical Nutrition

Interested students should complete the academic requirements for the didactic...
adequate academic support, including advising and academic planning, to students enrolled in the College of Human Ecology at Cornell University. The goal is to ensure that deficiencies can be identified and work evaluated while they are at Cornell prior to graduation. Students who will graduate in May are encouraged to have their academic credentials reviewed by the appropriate advisors. All students who will graduate in May, in consultation with their advisors, are expected to develop a concentration of academic requirements that will lead to a professional portfolio. Students in the apparel design major must begin working with their advisors early to develop a professional portfolio of work. Students are free to change advisors; changes must be recorded with the advisor of the appropriate major.

**Academic Advising**

All TXA majors are matched with a faculty adviser by the director of undergraduate studies, Anil Netravali (201 MVR). Students are strongly urged to discuss their goals, course selection, and career plans with their faculty adviser. Students in the apparel design major must begin working with their advisors early to develop a professional portfolio of work. Students are free to change advisors; changes must be recorded with the advisor of the appropriate major.

**Ownership and Exhibition of Student Work**

All apparel design work done as part of the academic program is the property of the department until it has been released by the instructor. Certain exceptional work may be retained 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. The curriculum is based on manipulation of form, color, and the physical characteristics and structures of fabric to solve aesthetic and functional apparel problems, the application of economic and marketing principles to consumer and industry problems in the textile/apparel sector; and the study of chemical, physical, and engineering properties of fibrous structures and polymers. All 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 major integrates design, technology, physical sciences, the humanities, and social sciences in the study of clothing, its materials, and its functions. Using a problem-solving approach, the design process is studied and applied in the creation and critique of fashion and functional apparel. The relationships between dress and human behavior, aesthetics, and fashion are studied within the context of the meaning of dress. The materials and technologies used in apparel design and the product interface with the consumer are also integral to the major. The themes of technological innovation, cultural transmission, innovation by consumers and designer, and geopolitical change are stressed as topics of engagement.

**Option II: Apparel/Textile Management**

Apparel and textile management combines the fields of apparel and textiles with those of economics, business management, and organizational policy. Students combine theory and aid in program planning, policy analysis, program evaluation, 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—social welfare/family, health, or consumer policy. Social welfare/family policy includes a panoply of governmental and private sector income maintenance, social, and human service delivery programs and policies that range from child adoption to family planning. A specific focus in the consumer concentration is the role of marketing and its relationship to consumer well-being and consumer behavior. In addition to meeting college requirements, all PAM majors are expected to take the following core courses: Introduction to Management, Research Methods, Multivariate Statistics, and Public Sector Economics. Students will also be expected to develop a concentration of three courses in either social welfare/family, health, or consumer policy. Finally, all PAM majors are required to complete an integrative capstone experience, which may involve an experiential learning program such as Cornell in Washington, the Capital Semester, or Urban Semester, or an honors thesis. Please check with the undergraduate advising coordinator, Professor Alan Mathios, for further details.

**TEXTILES AND APPAREL**

The Department of Textiles and Apparel (TXA) focuses on the use of textiles and fibrous materials for apparel, composites, biomaterials, residential and contract interiors, geotechnical and other applications. Programs in the department, in keeping with the overall mission of the college, emphasize the use of materials to meet human needs. The undergraduate curriculum focuses on the development of design skills, an understanding of textile materials, knowledge of marketing, and the use of technology in the industry.

Practical problem-solving skills are developed in the department's studios and laboratories. Academic course work is further enhanced by field and international experiences. Gallery space provides a 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.
with case studies to find solutions to everyday problems. Course work is drawn from many interrelated disciplines, including textiles, apparel, product development, economics, business management, and communication, as well as practical field experiences. This provides students with the experience of working with professionals from a wide variety of disciplines. Students often combine this option with either Option I (Apparel Design) or III (Fiber Science).

Option III: Fiber Science
Applications for textile structures include advanced engineering composites, protective clothing for industrial and military environments, and biomedical materials, as well as the more traditional applications found in apparel and home furnishings. 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 Textiles and Apparel have found challenging employment within the textile and apparel sector, in independent and government-sponsored research, and in community organizations. Recent graduates are working in the fields of design, management, new product development, engineering, communications, and marketing. In addition, the program prepares students for graduate or professional study in fiber and polymer science, textile marketing, apparel design, textiles, or business and management.

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 MVR 205.

INDIVIDUAL CURRICULUM
A student who has educational and professional attributes 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, and not exceed the normal number of credits allowed in the endowed divisions. A student develops an individual curriculum in consultation with faculty advisers from at least two subject-matter fields and the program coordinator, Patti Papapietro, Office of Admission, Student and Career Services (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 formally developing a program of study. Although the coordinator must approve the course enrollment schedule during course enrollment each term, it is a student's responsibility to follow the curriculum as planned or to have any necessary revision approved in writing by his or her adviser and the program coordinator before the program change.

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 study with 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
- GPA of 3.0 or higher, good academic standing, and well-articulated goals for students' study abroad
- Completion of the Cornell application, applications from individual programs also must be submitted to Cornell.
- Students must take the equivalent of 15 semester credits per term while abroad.

*Courses must be taken for a letter grade (unless the course is offered with only an S-U option). A petition is required for second-semester seniors going abroad.*

Application Process
Typically, students considering study abroad begin their planning at least a year before the semester abroad. Students should carefully consider what they hope to get out of a study abroad experience (academically and culturally) when investigating program options. Resources include the Cornell Abroad Office (300 Caldwell Hall), through the Human Ecology Study Abroad adviser (170 MVR Hall), or in the Human Ecology Career Development Center (162 MVR Hall). Applications may be found through these resources or in the Human Ecology Registrar's Office (145 MVR Hall). Completed applications must be submitted to the Human Ecology Registrar's Office by the following dates:

Fall and year deadlines: February 1
Spring: 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: 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 the 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 term 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 prior to 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
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 (DFA 472), involves service to local agencies (e.g., local nursing homes, Office of Aging, assisted-living facilities), where students gain valuable experience. Students may also join the "Elderly Partnership" through the Cornell Public Service Center to participate in local visits to elders. There also are opportunities for undergraduates to become involved in research projects examining topics such as residential changes and adjustments in the later years, care of 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 advisers 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 Office of the College Registrar (145 MVR, 255-2235) or from Nancy Wells, Bronfenbrenner Life Course Center (E220 MVR, 254-6330).

Concentrations

The College of Human Ecology formally recognizes as concentrations computer information sciences and international relations (both administered by the College of Arts and Sciences) and the previously described concentration in gerontology (administered by the College of Human Ecology). Students interested in pursuing these concentrations should inquire with the college department offering them. If successfully completed prior to graduation, these concentrations will be posted as part of the student's official transcript.

Students may develop an unofficial concentration in addition fields taught at Cornell by taking 12 credits in an approved area. Africana studies, communications, and business are just a few examples of concentrations that are possible. While these unofficial concentrations are not part of a student's transcript, students may choose to publicize these concentrations on their personal résumés.

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 (one to two 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 Hall, 607-255-1846, or the Urban Semester Program in New York City at (212) 746-2273.

New York City offers a wide variety of internship settings. Many bicultural and multicultural 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, St. Barnabas Health Center for Children and Families, Memorial Sloan Kettering Hospital, Hospital for Special Surgery, Montefiore Hospital, Bellevue Hospital, Our Lady of Mercy Hospital

Private and public law—NOW Legal Defense and Education Fund, Agenda for Children Tomorrow, Skadden Arps, Slate, Meagher, & Flom, Lawyers for Children, DA's Office, Legal Aid Society, AALDEF, Committee Against Anti-Asian Violence, Center for Immigration Rights, NAACP-LDF, Dorsey & Whitney


Private and public schools—Beginning with Children, Banana Kelly High School, East Harlem School at Exodus House, The Hetrick Martin Institute, Nuestros Niños, Theodore Roosevelt High School, The Choir Academy of Harlem, Andrae Wells, ERIC Center, River East School, MS 118, Mott Haven Village


Other Off-Campus Programs

Capital Semester
William Rosen, Ph.D., director
Combine a full semester of 15 Cornell credits with a paid internship and a reduction in tuition. Students intern directly for a New York State legislator (Senate or Assembly) in Albany to explore their policy interests in greater depth. Interns attend hearings and legislative sessions, meet with lobbyists and constituents, write reports for legislation and possible publication, and generally help conduct the work of their legislator. All Cornell students, regardless of major, are encouraged to apply. The program is available during the spring semester only, and it is open to sophomores, juniors, and seniors. Interns greatly benefit when applying for future employment, law school, graduate school, or business school. Information is available from the Career Development Center (MVR 162), and applications and further information can be obtained from Professor Bill Rosen (MVR 259, wrl4@cornell.edu).

Cornell in Washington
Students take courses from Cornell faculty, conduct individual research projects, and work as externs while taking advantage of the rich resources of the nation's capital. For more information, visit the program office (471 Hollister 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 term and a maximum of 12 credits in four years. Exceptions will be granted to Cornell students enrolled in methods and practice teaching. Ithaca students pursuing a concentration in exercise science through a specially arranged program with Ithaca College. Cornell students are eligible to register only for Ithaca and Wells College courses that are relevant to their program and that do not duplicate Cornell courses. Ithaca and Wells College credit counts as Cornell credit, but not as Human Ecology credit. Students are accepted on a space-available basis. Participation in this program is not guaranteed, and both Ithaca and Wells have the right to accept or reject students for any reason deemed appropriate. The program is available only during the fall and spring semesters. For further information, contact the college registrar (145 MVR, 255-2255).

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, these students will take the first-year Sloan courses, which will be counted twice to satisfy both undergraduate as well as graduate requirements. At the end of their senior year, students will graduate with a B.S. degree. If the student's grades are competitive, they will be invited to continue for the final year of Sloan as a graduate student. Those students accepted for the five-year program will participate in a health care administrative internship during the summer after earning their B.S. degree and following the first year of Sloan academic coursework. The following year they will complete the second year of required Sloan courses and electives and will earn a Master in Professional Studies, with Sloan certifying completion of the requirements for a graduate degree in health administration.

Students applying to the accelerated M.P.S. 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 adviser and at least one other source, as well as transcripts and the statement of purpose. During their final senior undergraduate year they also will have to submit a formal application to the graduate school. A sample schedule of the two-year curriculum for Sloan can be viewed at: www.human.cornell.edu/pam/sloan/2005curric.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 required 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 Cornell, they need to plan ahead to ensure that distribution and major requirements for the B.S. degree will be met. Successful applicants need the approval of the college registrar in Human Ecology.

ACADEMIC ADVISING AND STUDENT SERVICES

Faculty Advisers
Students who choose to major in a particular department are assigned an adviser whose special interests match their need. Students may change advisers as their own interests change by working with the director of undergraduate studies (DUS).

Faculty advisers are available to discuss course requirements and sequences, useful electives inside or outside the college as well as future goals and career opportunities. Although advisers must provide the adviser key number (PIN) during course enrollment each term, 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 for students who are exploring alternative majors should work closely with college counselors in the Office of Admission, Student, and Career Services.

Office of Admission, Student, and Career Services
The Office of Admission, Student, and Career Services (ASCs) (170-172 MVR) is a center for undergraduate freshman and transfer admission activities; student orientation activities; academic, personal, and career advising; study abroad; and multicultural student programs.

Personal counseling, including exploration of problems or concerns of a personal nature, is available to all students. These ASCs counselors, however, are not psychiatrists or therapists; they are available to help you understand and navigate the Cornell system, and to offer support, assistance, and referral. Discussions are completely confidential. Appointments may be made through the receptionist in ASCS or by calling 255-2532.

In addition, ASCS provides support for several student organizations, including Human Ecology Ambassadors, the Mature Students Association, the ACE Center for Students of Color, the Pre-professional Association towards Careers in Health, the Pre-law Undergraduate Society, the Orientation Committee, and Human Ecology Voices. Primary responsibilities of the office are listed below:

Academic advisement. This service is provided to all students as an adjunct to faculty advising. Counselors can 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 are urged to work closely with student services staff to plan their program of study. For the period a student is undeclared, counselors will provide assistance during course enrollment.

Career counseling. Career counseling is designed to help students clarify the relationship between personal skills, abilities, and career goals. Services are offered on an individual or group basis. Counselors assist in identifying career outcomes of the majors, developing networking skills, suggesting...
course work appropriate to various career goals, and assisting students in their general internship and job searches.

Post-graduate advisement. Material pertaining to graduate and professional schools, graduate entrance examinations, courses of study, and career outcomes is readily available.

Students with disabilities. The college is committed to assisting students with disabilities. Students who have special needs are urged to contact the Student Disability Counselor. Complete information is available from the Office of Financial Aid, 203 Day Hall.

**The Human Ecology Alumni Association Cash Award Fund** This fund provides small emergency grants to students in the college who have unexpected financial problems. Applications may be made through ASCS.

**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.sws.cornell.edu/our. The college registrar (145 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 classes, correcting student records, and approving the transfer of credit from other institutions.

**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 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 Services includes a director of multicultural programs who assists in the recruitment, admission, and enrollment of the most qualified and appropriate EOP (a program for New York State residents), African American, Native American, Hispanic American, and Asian American students to the college. All EOP students are invited to a special university-wide pre-freshman summer program that introduces accepted students to the Cornell campus and its classrooms. Services for current students include EOP/COSEP; academic, career, and personal counseling; recommendation letters for employment or graduate schools; and advising and support for student activities and programs.

**The Human Ecology Partnership Program** provides mentorship through a network of faculty and upper-class students to all incoming students of color, particularly during their first year. In addition, this office serves as a liaison to the Office of Minority Education Affairs (COSEP), State Programs (EOP), and the Learning Strategies Center. Students are also encouraged to visit the college's Career Development Center to enhance personal career exploration and decision making.

Selected programs include the following:

- **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, 255-9497).
- **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, to 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/retenion and career development. For more information contact Veredee Lee (172 MVR, 255-2532).

**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 Veredee Lee (172 MVR, 255-2532); Gary Evans in the Department of Design and Environmental Analysis (E306 MVR, 255-4775); or Lorraine Maxwell in the Department of Design and Environmental Analysis (E310 MVR, 255-1958).

**CSTEP** The Collegiate Science and Technology Entry Program is the New York State program that provides enrichment activities for pre-law, New York State residents. Services are targeted at populations who are historically underrepresented in scientific, technical, health-related, or licensed professions and/or who are economically disadvantaged and who demonstrate interest in, and potential for, a CSTEP-targeted profession. For more information, contact Veredee Lee (172 MVR, 255-2532).

**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 requirements. The college encourages students to incorporate courses from these cultural programs and from study abroad experiences in their degree programs. See information on study abroad opportunities.

- Africana Studies and Research Center
- American Indian Program
- Asian American Studies Program
- East Asia Program
- Feminist, Gender, and Sexuality Studies Program
- Gender and Global Change
- Institute for European Studies
- Languages and Linguistics
- Latin American Studies Program
- Latino Studies Program
- Peace Studies Program
- Program for Contemporary Near Eastern Studies
- Program in Jewish Studies
- Religious Studies
- South Asia Program
- Southeast Asia Program
- International Students

The International Students and Scholars Office (ISSO, B50 Caldwell Hall, 255-5245) provides a broad range of services to international students. All international students should maintain contact with the ISSO. Counselors in ASCS are also available for assistance.

International students in the College of Human Ecology are encouraged to meet with the college registrar to discuss any questions or concerns that they have about their academic record.

**Career Planning, Graduate and Professional School, and Job Search Services**

**Counseling.** The Office of Admission, Student, and Career Services (ASCS, 172 MVR, 255-2532) provides career counseling and resources to help students explore career options through employment and internship opportunities, and professional and graduate school advising. Individual assistance is available as well as group programming, workshops, panels, and field trips. Career development is strongly encouraged and supported, including skill development in resume writing, networking, and interviewing. Students also are instructed in the use and protocol of on-line resume submissions and on-campus recruiting. The office works in conjunction with Cornell Career Services (103 Barnes Halls, 255-5221) to facilitate access to university-wide programs.

**The Career Development Center (CDC, 162 MVR)** is a starting point for students looking for career information. Selected resources about career planning and job search techniques, general directories to begin job or graduate school searches, and information for alumni networking are housed here. Also available are Cornell Career Services handouts and registration forms, graduate and professional school testing booklets and registration packets, study abroad, and Urban Semester program materials. Computer terminals provide access to web-based information regarding internship and employment opportunities, as well as graduate/professional schools.

The CDC is open weekdays during the regular school term. Student career assistants are available to provide resume and cover letter critiques, conduct mock interviews on video, and help navigate the library resources. Final critiques can be provided by a career
counselor once the student review has been completed.

Former Urban Semester Program participants comprise a portion of the CDC student staff and are available daily to answer questions about the program and its application process. Selected services are listed below. They will help you to investigate your interests, skills, and values as they relate to career options, provide you with useful information and tips for a successful summer or full-time job search, and provide access to employment opportunities. In addition, please refer to the college's career services web site: www.human.cornell.edu/student.

PreLaw or Premed. Students who consider themselves prelaw or premed are encouraged to join a student group affiliated with ASCS. Those interested in a law career can join PLUS (PreLaw Undergraduate Society) where information on applying to law school, preparing for the LSAT, and examining career opportunities in law is provided. Students interested in pursuing a health-related career are welcome to join PATCH (Professional Association Towards 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.

Extern Program. Spend one day to one week over winter break shadowing an alum in a career field of your choice. Observe day-to-day activities, discuss specific jobs and careers, and sometimes obtain limited hands-on experience. This service is available to sophomores, juniors, and seniors.

Fresh Program. This service is similar to the Extern Program but is available to freshmen only. Spend one day to one week over spring break shadowing an alum in a career field of your choice. In addition to career explorations, the Extern and Fresh programs provide excellent networking opportunities.

Internship and Employer Files. The CDC keeps files of more than 300 internships and hundreds of potential employers for student review.

Student Jobs and Internships. This is an electronic listing of information about internships and career-related summer and academic year employment that is exclusive to Cornellians.

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.

AlumnNet. Students have access to Human Ecology alumni who can provide information on their careers and offer suggestions on a job search in their particular field or location. Students can query alumni on a host of variables and review selected alumni resumes to learn more about specific careers.

Job Search Workshops. The college hosts approximately 10 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 an effective job search, write a resume' and cover letter, and interview successfully.

CornellITRAK. Exclusively for Cornell students, CornellITRAK provides a listing of job opportunities available. Most are full-time jobs, although some summer opportunities are listed. Search by field, geographic location, or both.

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, along with a few nonprofit organizations.

New York Recruiting Consortium. Available exclusively to Human Ecology and Arts and Sciences students, the New York Recruiting Consortium happens 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 (occurs 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, New York, to meet with you for individual appointments. During the spring semester, a job fair occurs 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 (100 Day Hall). Curriculum sheets are available in the Human Ecology registrar's office (145 MVR Hall). 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 earned after matriculation. Students requiring additional semesters to fulfill their graduation requirements must meet with a Human Ecology counselor (112 MVR) and request for an extension.

Grade Point Average Requirement for Graduation
• Students must earn a minimum cumulative grade point average of 2.0 (C) or better to graduate. Note: students matriculating prior to spring 2004 may continue to follow the older cumulative grade point average 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. An unlimited number of credits may be taken in Cornell's statutory colleges.
  • 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 prior to matriculation (including AP, IB, and college credits) toward the 120 credits required for graduation. For all students, an additional pre-approved 15 in absence credits earned after matriculation may be applied. AP, IB, and transfer courses may be applied toward fulfillment of specific requirements regardless of whether the credit is transferred (i.e., required courses may be waived). Refer to the section on Advanced Placement credit for full details.
  • No college credit earned prior to matriculation and used to meet Cornell's minimum admission requirements may be counted in the 120 credits required for graduation. This policy does not apply to transfer students.
  • Courses taught by a college in the high school setting are not allowed to count for either credits or fulfillment of requirements (i.e., Syracuse Project Advance).
  • Cornell extramural credit (defined below) is limited to 15 credits toward the 120 required.
  • Strict limitations exist on the number of credits that can be applied toward the 120 credit minimum for special studies courses (400, 401, 402), for 403 courses, and for courses taken with an optional S-U grade. Details follow.

Human Ecology Credit Requirements
• The college divides the 120 minimum required academic credits into four general categories. (Refer to curriculum sheets for your major for specific details on course requirements. These sheets are available in the Office of the Registrar (145 MVR) and in the Office of Admission, Student, and Career Services (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 cannot be applied toward this requirement.) A maximum of 3 credits from the 401-403 special studies series courses may be used toward this...
course-specific rules are listed below.

S-U grading rules for this requirement are as follows:

1. If a course counting toward the 40-credit requirement is also a requirement in Category II, the course may NOT be taken for an S-U grade unless it is the only grade option offered for the course.

2. Courses used to count toward Category III (electives) that are taken for an S-U grade may also count toward the 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 400-402 special studies series may be applied to this requirement. Other course-specific rules for this requirement are listed below.

S-U grading rules for this requirement are as follows:

1. If a course counting toward the 9-credit outside-the-major requirement is also a requirement in Category I or II, the course may NOT be taken for an S-U grade unless it is the only grade option offered for the course.

2. Courses used to count toward Category III (electives) that are taken for an S-U grade may also count toward the 9-credit outside-the-major requirement.

3. Students should refer to the section on S-U grading rules for full S-U grading details.

Course-specific rules that apply to BOTH the 40 Human Ecology credit requirement and the 9 Human Ecology credit outside-the-major requirement:

1. Effective fall 2004, Human Ecology courses below the 300 level (such as HE 100, HE 101, HE 120, and HE 201) do not count toward either the 40-credit requirement or the 9-credit outside-the-major requirement. These courses may be used as elective credit.

2. ECON 101 and ECON 102 are considered Human Ecology credit courses and may be used to fulfill Human Ecology’s 40- and 9-credit outside-the-major requirements. If either or both courses are taken to fulfill a Category I or II requirement, they must be taken for a letter grade.

3. Experiential credit is applied to Human Ecology’s 40- and 9-credit outside-the-major requirements as follows:

   • Urban Semester (HE 470, HE 480, HE 490-495). For this entire semester students in all Human Ecology majors earn:
     - 6 credits toward the 40-credit requirement, which also count as 6 credits toward the 9-credit outside-the-major requirement. The remainder of these credits counts as elective credit.
     - Capital Semester (PAM 392). For this entire semester PAM majors earn:
       - 7 credits toward the 40-credit requirement, which also count as 7 PAM credits.
       - Non-PAM majors earn:
         - 7 credits toward the 40-credit requirement, which also count as 7 credits toward the 9-credit outside-the-major requirement. The remainder of the credits counts as elective credit.

   • Cornell in Washington (PAM 406). For this entire semester, PAM majors earn:
     - 8 credits toward the 40-credit requirement, which also count as 8 PAM credits.
     - Non-PAM majors earn:
       - 8 credits toward the 40-credit requirement, which also count as 8 credits toward the 9-credit outside-the-major requirement. The remainder of the credits counts as elective credit.

Elective Credits

- Students have individual objectives in choosing courses beyond the minimum requirements of the major. The university is diverse; the departments, centers, and special programs numerous; the fields of study almost unlimited. Counselors and faculty advisers are available to discuss which courses may interest students and best round out their education.

- Students should consult the index in this book 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.

Human Ecology students will be billed for courses taken at endowed colleges if credits taken exceed the following limits:

- Students are allowed 21 credits of endowed courses in their major or as electives, they may take more than 21, but will then be billed at the endowed rate of tuition for the extra credits.

- To the extent possible, courses taken in the endowed colleges will be counted to meet distribution requirements in Category I. More than 40 endowed credits taken in Category I, however, will count against the 21 allowed endowed elective credits.

- Endowed credits earned in Category II (even if the endowed courses are required for the major) and Category III will be counted against the 21.

- Required credits listed in the requirements charts for Categories I and II are the minimums; credits taken in excess of those minimums count toward the additional credits required in Category III to make a total of 120 credits (90 courses and physical education courses do not count toward this 120-credit requirement).

Students may choose to take additional courses and graduate with more than 120 credits.

- Elective credits in Category III earned in Cornell’s endowed divisions during summer session, study abroad credits, in absentia credits, and transfer credits do not count against the 21 credits allowed in the endowed divisions.

Physical Education Requirements for Graduation

- Students must earn two credits of physical education within their first two semesters. These two 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 one 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.

- Students must pass the university’s swim test. Students who transfer more than 25 credits (excluding AP credits) are exempt. Refer to University Requirements for Graduation—Physical Education—Swim Test in this book for specifics.

Minimum Semester Requirements

- 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 each of the freshman and sophomore years (ECON 101 and 102 may be used to fulfill this requirement).

- Students must carry 12 credits each semester, excluding physical education, to be matriculated as full-time students. Mature students must carry six credits each semester (See Mature Student Guidelines for details).

- 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 from the Office of Admission, Student, and Career Services (172 MVR).

Special Studies

- Students may use only 12 credits of 400, 401, 402, or 403 courses toward graduation.

- Additional credits of 400, 401, 402, or 403 courses can be taken but will not be applied toward graduation.
Advanced Placement Credit

Refer to section above entitled "Cornell Credit Requirements" for details on how many Advanced Placement (AP) credits can be applied toward the 120 credits needed for graduation.

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 book. College-specific rules apply toward many AP courses such as biology, English literature, English composition, and statistics. Details may be found at http://human.cornell.edu/registrar/regdata/ap.cfm.

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 Baccalaurate (IB) is evaluated individually.

**Note**: Cornell does not accept credit for courses sponsored by colleges but taught in high schools to high school students or at colleges if enrollment is targeted at high school students. This is true even if the college provides a transcript of such work. These courses also cannot be used to fulfill college requirements. Students who have taken such courses may, however, take the appropriate CEEB test to qualify for credit as in paragraph 1 above. For further information and limitations on Advanced Placement credit, see the front pages of this book.

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. Many Cornell students who plan to work with non-English-speaking people in this country or abroad often find it necessary to be proficient in another language. Many study abroad programs in non-English-speaking countries require the equivalent of two years of college-level language study.

Extramural Credit

Extramural credit is administered by the Office of Continuing Education and Summer Sessions (B20 Day Hall, 255-4987). Extramural credit is charged by the credit hour at the endowed tuition rate. Students may count only 15 credits of extramural credit toward their degree requirements. A student may enroll for extramural credit during the fall or spring semester only if he or she is not registered in the College of Human Ecology. For example, some students enroll for extramural credit before matriculating at Cornell.

An exception to this rule is credit earned in the Ithaca College or Wells College exchange programs. Students enrolled in these programs simultaneously maintain their status as students registered in the College of Human Ecology.

Humanities

Only certain classes will count for Category I. Humanities. To determine eligibility the college uses the following definition: "The humanities include the study of literature, history (including art and design history), philosophy, religion, and archaeology. Critical, historical, and theoretical studies of the arts and design are considered humanities. Languages and creative or performing arts such as the writing of fiction or poetry, painting, sculpting, designing, composing or performing music, acting, directing, and dance are not considered humanities." Additionally, social science courses such as sociology, government, anthropology, and psychology are not considered humanities.

Specifically, courses in the following list will count as humanities:

- Africana Studies (literature and history)
- Archaeology
- Asian American Studies
- Asian and Near Eastern Studies (literature and history)
- Classics (literature and history)
- Comparative Literature
- Design and Environmental Analysis 111, 243, 251, 443
- English (literature only)
- History
- History of Art/History of Architecture
- Human Development 241, 359, 417
- Landscape Architecture 282
- Music and Theatre Arts (theory, literature, and history only)
- Natural Resources 407, 411
- Philosophy
- Policy Analysis and Management 631, 634, 652
- Religious Studies
- Rural Sociology 100, 175, 318, 442

**PROCEDURES**

**Registration and Course Enrollment**

**Registration Requirements**

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

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

To become a registered student at Cornell University, a person must complete course enrollment according to individual college requirements; settle all financial accounts including current semester tuition; satisfy New York State health requirements; and have no holds from the college, the office of the Judicial Administrator, Gannett Health Center, or the Bursar.

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 utilize the official 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 (145 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 for the second or 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 term may be withdrawn from the university. Human Ecology students who do not arrange payment agreements with the university bursar by the last day of classes for a semester will be withdrawn from the university. Furthermore, credit for any classes attended for the semester will not be awarded regardless of the letter grade received for a class. Should withdrawn students wish to return, they must reapply through the college admissions office.

Proration of Tuition

Except for mature students, it is seldom possible to have tuition prorated if a student carries fewer than 12 credits during a semester. See the college registrar (145 MVR) or counselors (Office of Admission, Student, and Career Services at 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 only be considered for requests of between 3 and 10 credits. All requests should be made to the college registrar (145 MVR) by the end of the pre-enrollment period in the prior semester.

Course Enrollment

Initiating the Process

CoursEnroll selections are only “requests” for seats in classes. Between the end of the CoursEnroll period and the beginning of the next semester, course requests are evaluated by the offering college department. Students can determine if their requests have been successful when final schedules are published prior to the add/drop period. Students are expected to make course requests for the subsequent semester during a specified time in the current semester. Those dates are advertised publicly and available on the University Registrar’s web site (www.sws.cornell.edu/our). Only changes take place electronically, usually software available through Just the Facts. During this time, each student must meet with his or her faculty adviser to discuss academic plans and to obtain the advising PIN code required for finalizing course requests. A student may enter and hold requests for courses prior to entering their PIN. Once the PIN number is entered, however, the schedule is locked and it is not possible to change until the add/drop period of the next term. Important: students who fail to finalize the CoursEnroll process by not entering their PIN code by published deadlines will lose all course requests.

Information on courses is readily available in this book and in the Course and Time Roster for each semester. Both of these publications can be accessed on the web through CUIInfo.

Incoming students will receive tentative schedules upon their arrival to campus, and will meet with faculty advisers during the orientation period.

Course Loads

Full-time matriculated students must carry at least 12 credits (exclusive of physical education courses) to maintain full-time status. Refer to the preceding section on 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. Classes cannot be withdrawn from 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 145 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 accuracy of course numbers, credit hours, grade options, and other data. Errors must be corrected immediately. Procedures for correcting enrollment errors as well as for making any other changes are described below under Course Enrollment Changes.

Course Enrollment Changes

It is to the student’s advantage to make any necessary course enrollment changes as early in the term as possible. Adding new classes early makes it easier for the student to keep up with class work. Dropping a class early makes room in the class for other students who may need it for their academic programs. Ideally, students evaluate their class workload carefully at the beginning of the term. 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 adviser.

Deadlines for Add/Drop and Grade Option Changes

Note: briefer add/drop periods exist for First Year Writing Seminars and half-semester courses.

- During the first three weeks of the term, courses may be added, dropped, or the grade option changed. Special status courses (400, 401, 402) may be added through the 11th week of classes. 403 Teaching Apprentice courses must be added during the first three weeks of the term.
- From the fourth through the seventh week of the term, courses may be dropped. Grade option changes cannot be made at this point regardless of instructor’s permission.
• After the seventh week of the term, any requests for course changes must be made through the petition process. Students should request an appointment with an Admission, Career and Student Services counselor in 172 MVR to initiate the process.

• After the seventh week of the term, 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 term.

Deadlines for Half-Term Courses
Students may drop half-term 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 term, a student must file a general petition form. (See the section, Petition Process.) Students are expected to attend classes and 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 book 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 Enroll 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 department secretary (100 Olive Tjaden Hall) before enrolling in the course. Seniors who want to take an elective course in the Johnson Graduate School of Management are required to obtain permission of the instructor on a course authorization form that the student then files with that school's registrar in Sage Hall.

Course Enrollment while Studying Abroad
Students who plan to study abroad have several options available to enroll for their returning semester at Cornell. Students can consult with their faculty adviser before departure to consider the schedule of classes that they wish to take upon their return to campus. Once abroad, the student can use the web to access the Cornell University Courses of Study and the Course and Time Roster for the coming term. The roster is available on the web in 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 adviser for approval; the faculty adviser can then e-mail the requests 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 adviser and ask the faculty adviser to submit the course requests to the college registrar. 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 adviser 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 over-enrolled, students are generally assigned on the basis of seniority or by criteria defined for each course as listed in this book. Students' professional goals may be considered. Those students not admitted to a course may be placed on a waiting list maintained by the professor or the department offering the course. Cross-listed Courses
In order 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, the change must be made during the official add period for the first three weeks of each semester. To do so, students must complete a special form, which can be obtained in the registrar's office in 145 MV. 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 cannot receive 3 credits toward graduation requirements if they take D SOC 101 and SOC 101. Because both are Introduction to Sociology, only 3 credits would be allowed. To aid students in this evaluation, the college maintains a partial list (those that are commonly required in Human Ecology curricula) of Cornell courses that have duplicate content. Other courses with similar content may be found at the following web site: www.human.cornell.edu/registrar/regdata/duplicates.cfm.

Special Studies Courses
Each department in the College of Human Ecology (DEA, HD, DNS, PAM, and TXA) offers special studies courses that provide opportunities for students to do independent work not available in regular courses. One of those courses, designated 300, 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 400, Directed Readings; 401, Empirical Research; and 402, Supervised Fieldwork. Juniors and seniors normally take those courses, and a faculty member in the department in which the course is offered supervises work on an individual basis. It is important for students to use the appropriate course number (300, 400, 401, or 402) for a special project.

To register for a special studies course, a student obtains a special studies form from the departmental office where they plan to take the course. The student discusses the proposed course with the faculty member under whom 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 adviser, and department chair before submitting the form to the Office of the College Registrar (145 MV). Special studies forms are available in 145 MV 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 one 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 the section on 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 college.

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 for which 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 the Course Enrollment Changes section for some of the important deadlines. If unsure of a deadline, check with a counselor in the Office of Admission, Student, and Career Services (172 MVR) or with the Office of the Registrar's staff (145 MV).

A general petition may be needed to carry fewer than 12 credits, withdraw from a class after the seventh week deadline, drop a course after the third week deadline, change a grade option after the third week deadline, or with the Office of the Registrar's staff (145 MV).
graduation requirements, substitute a required course in one's major with another course, or stay an additional semester to complete the graduation requirements.

Although many kinds of requests can be petitioned in the college, options other than petitioning may be preferable in some cases. To explore whether a petition is appropriate, the student may discuss the situation with a college counselor or the college registrar.

If a student decides to submit a general petition, the form is available in the Office of the Registrar (145 MVR) and in the Office of Admission, Student, and Career Services (172 MVR) or on the web at www.human.cornell.edu/student/forms/. After completing the form and obtaining the required signatures, the student must turn the form in to the Office of the Registrar. Once a decision is made, a letter is placed in the student’s college mail folder indicating approval or denial of the petition.

Students may appeal the college registrar's decision to the Committee on Academic Status. Students who elect to appeal have the option of appearing in person before the committee to state their case. A member of the counseling staff can guide a student through this process.

In Absentia Study

Under certain conditions, credit toward a Cornell degree may be given for in absentia study, that is, study done at an accredited institution away from Cornell after the student matriculates in the College of Human Ecology. In absentia study can be done during any term; fall, winter, spring, or summer. First-Year Writing Seminars cannot be taken in absentia.

To be eligible for in absentia study, a student must be in good academic standing and must receive permission in advance from the college registrar. A student not in good standing may study in absentia but will not receive transcript credit until the Committee on Academic Status has returned the student to good standing. Students not in good academic standing who wish to finish their degree in absentia must seek pre-approval from the college's Committee on Academic Status via the general petition process. In some cases, students may petition for in absentia study after the work has been completed, but there is no guarantee that such credit will be awarded without advance approval.

In absentia petition forms are available in the Human Ecology Registrar's Office (145 MVR) or on the web at www.human.cornell.edu/student/forms/. If the student submits the form to the Human Ecology Registrar's Office (145 MVR) in absentia study during the fall or spring term carries a nominal administrative fee. Contact the Registrar'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 coursework 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 their college. Students who study abroad during the summer or winter term are limited to a maximum of nine 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 terms cannot receive credit for nondomestic campus programs.

On rare occasions a student's petition for more than 15 credits in absentia may be allowed:

1. The student has completed at least one full semester of outside study at an accredited institution from which the student has received credit (grade S or U) or been placed into a university course on the basis of an equivalent college placement test after returning to Cornell.

2. The student has completed an approved program of study at an accredited institution that is equivalent to Cornell coursework taken at the same level.

3. The student has completed an entire course in absentia and the student has been placed in the Cornell equivalent course.

The student is responsible for having the appropriate department or college withdraw the courses from the student's Cornell transcript and the appropriate credit will be recorded. A student's petition for in absentia study will be approved if it meets one of the above conditions.

In absentia study is allowed:

1. The work taken represents a component of the student's major or minor.

2. It is the student's major.

3. It is the student's major.

4. The student has completed the equivalent coursework at Cornell.

5. The student has a letter from a department at Cornell granting approval.

The student is responsible for having the appropriate department or college withdraw the courses from the student's Cornell transcript and the appropriate credit will be recorded. A student's petition for in absentia study will be approved if it meets one of the above conditions.

In absentia petition forms are available in the Human Ecology Registrar's Office (145 MVR). In absentia study during the fall or spring terms 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 terms cannot receive credit for nondomestic campus programs.

On rare occasions a student's petition for more than 15 credits in absentia may be allowed:

1. The work taken represents a special educational opportunity not available at Cornell.

2. It relates to the student's professional goals.

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 the student's major. If in absentia credit is granted, the student must turn the form in to the Office of the Registrar. Once a decision is made, a letter is placed in the student's college mail folder indicating approval or denial of the petition.

Students may appeal the college registrar's decision to the Committee on Academic Status. Students who elect to appeal have the option of appearing in person before the committee to state their case. A member of the counseling staff can guide a student through this process.

In Absentia Study

Under certain conditions, credit toward a Cornell degree may be given for in absentia study, that is, study done at an accredited institution away from Cornell after the student matriculates in the College of Human Ecology. In absentia study can be done during any term; fall, winter, spring, or summer. First-Year Writing Seminars cannot be taken in absentia.

To be eligible for in absentia study, a student must be in good academic standing and must receive permission in advance from the college registrar. A student not in good standing may study in absentia but will not receive transcript credit until the Committee on Academic Status has returned the student to good standing. Students not in good academic standing who wish to finish their degree in absentia must seek pre-approval from the college's Committee on Academic Status via the general petition process. In some cases, students may petition for in absentia study after the work has been completed, but there is no guarantee that such credit will be awarded without advance approval.

In absentia petition forms are available in the Human Ecology Registrar's Office (145 MVR) or on the web at www.human.cornell.edu/student/forms/. After completing the form and obtaining the required signatures, the student must turn the form in to the Office of the Registrar. Once a decision is made, a letter is placed in the student's college mail folder indicating approval or denial of the petition.

Students may appeal the college registrar's decision to the Committee on Academic Status. Students who elect to appeal have the option of appearing in person before the committee to state their case. A member of the counseling staff can guide a student through this process.

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In some instances a student may be given a withdrawal by the college registrar. Students who leave the college without an approved leave of absence, or do not return after the leave has expired will be given a withdrawal after the seventh week of the term 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 Admissions for consideration along with all other applicants for admission. If the student was in academic difficulty at the time of the withdrawal, the request for readmission will be referred to the Committee on Academic Status (CAS) for consideration, and that committee may stipulate criteria under which the student may be readmitted to the college.

**GRADES AND EXAMINATIONS**

**Grade Definitions and Equivalents**

The official university grading system uses a system of letter grades ranging from A+ to D+ with F denoting failure. An INC grade is given for incomplete work and R is given at the end of the first semester of a two-semester class. If a student is given permission to withdraw from a class after the seventh week of the term a W is automatically assigned. Students can view their grades on Just the Facts after the semester has ended. Final spring semester grades are mailed to students' homes during the summer. See the "Grading Guidelines" section in this book for more information on the official university grading policies.

To compute a semester grade point average, first add up the products (credit hours X quality points) and divide by the total credit hours taken. Grades of INC, R, S, SX, U, UX, and W should not be included in any GPA calculations. A grade of F has no quality points, but the credits are counted thereby lowering the average. A cumulative GPA is the sum of all semester products divided by all credits taken. Refer to the section "Repeating Courses" for details on how GPA is affected if a student repeats a course. For further help on calculating a grade point average ask at the Office of the College Registrar (145 MVR).

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 have received an "F." If a student has previously passed a course they are taking a second time, the second registration will not count towards their degree requirements and the grade received will not be included in their cumulative GPA. If a student enrolls in a course in which they previously received an F, the credits from the second registration will count towards their graduation requirements and the grade will be included in their 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 at the Cornell web site). Courses listed as SX/UX are only available on an S-U basis and may not be taken for a letter grade. University regulations concerning the S-U system require that a grade of S be given for work equivalent to a C- or better; for work below that level, a U must be given. No grade point assignment is given to an S grade, and S or U grades are not included in the computation of semester or cumulative averages. A course in which a student receives an 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 the section 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 nine credits required in the college outside the major unless the requirements for a specific major indicate otherwise. Freshmen enrolled in English 137 and 138 (offered for S-U grades only) are permitted to apply these courses to the freshman writing seminar requirement. If a required course is only offered S-U, it will not count toward the 12-credit limit.

To take a course for an S-U grade, a student must check the course description to make sure that the course is offered on the S-U basis; then either sign up for S-U credit during course enrollment, or file an add/drop form in the Human Ecology Registrar's Office before the end of the third week of the term. Forms are available in the Human Ecology Registrar's Office. After the third week of the term, students cannot change grade options.

**Grades of Incomplete**

A grade of incomplete is given when a student does not complete the work for a course on time but when, in the instructor's judgment, there was a valid reason. A student with such a reason should discuss the matter with the instructor and request a grade of incomplete.

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.
course should require a final examination or some equivalent in place of, for example, 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 twenty-four hour time period and especially on any one day. It is urged that members of the faculty consider student requests for a make-up day. It is urged that members of the faculty

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 before 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 term 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 term, 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 term 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 preliminary examination schedule a year in advance. Instructors of smaller courses work out their own evening preliminary 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 evening prelims 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 prior to 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 preliminary meeting and an examination not on the schedule, the examination on the schedule shall have a priority, and the course not on the schedule must provide an alternate time to take the examination for those students faced with the conflict.

4. If there is a conflict between examinations, both of which are on the schedule developed at the annual evening preliminary 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. Note that courses using evening examinations are strongly urged to indicate this in the course description listed in Courses and must notify students of the dates of such examinations as early as possible in the semester, preferably when the course outline is distributed."

ACADEMIC STANDING

Criteria for Good Standing

The College of Human Ecology has established a set of minimum academic standards that all students must meet 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 101 and 102 may be used to fulfill this requirement).

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. If a student does not take a required First-Year Writing Seminar in the first semester that they matriculate at the College of Human Ecology, they will be placed on academic probation.

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 a FWS for the upcoming semester, a hold will be placed on the student's semester registration status until they are actually enrolled in a 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. The 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:

- Place a hold on a student's university registration status for the current or upcoming semester.
- Withdraw the student permanently from the college and Cornell University.
- Require the student to take a leave of absence for one or more semesters.
- Issue a warning to the student at one of the following levels:
  - Severe warning with danger of being withdrawn
  - Severe warning
  - Warning
- These imply that if the student does not show considerable improvement during the semester, the committee may withdraw the student.
- Add the student's name to a review list; students with this status are monitored by the committee throughout the semester.
- Return the student to good standing.

Students placed on a required leave must appeal to the 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. These appeals should be filed using the general petition process and submitted to the committee.

All students with an academic warning status will be automatically reviewed for specific criteria at the end of the subsequent semester. In most cases, students put on warning, severe warning, or severe warning with danger of being withdrawn status will be informed of conditions that they are expected to fulfill to return to good standing.

In general, these conditions are that a student must earn a minimum semester GPA of 2.0, complete 12 credits (exclusive of physical education), and not have any incomplete, missing, "F", or "U" grades on their most recent semester record.

If a student who has been previously placed on a required leave wishes to return to the college, he/she must submit a plan of study to the committee before being reenrolled.

Students who have been withdrawn from the college by the 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 Services (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/her situation with a counselor in the Office of Admission, Student and Career Services. The student also should also talk with others who may be able to help—faculty advisers, instructors, or a member of the university medical staff. Any information given to the committee is held in the strictest confidence.

**Academic Integrity**

Academic integrity is a critical issue for all students and professors in the academic community. The University Code of Academic Integrity states that 1) a student assumes responsibility for the content and integrity of the academic work he or she submits, such as papers, examinations, or reports and 2) a student shall be guilty of violating the code and subject to proceedings under it if he or she:

- Knowingly represents the work of others as his or her own.
- Uses or obtains unauthorized assistance in any academic work.
- Gives fraudulent assistance to another student.
- Fabricates data in support of laboratory or fieldwork.
- Forges a signature to certify completion or approval of a course assignment.
- Uses an assignment for more than one course without the permission of the instructor involved.
- Uses computer hardware and/or software to abuse privacy, ownership, or user rights of others.
- In any manner violates the principle of absolute integrity.

The college’s Academic Integrity Hearing Board, which consists of a chairperson, three faculty members, and three students, hears appeals from students who have breached the code. It also deals with cases brought directly to it by members of the faculty.

**Academic Records**

Students may obtain their Cornell academic record in several ways. The Cornell transcript, which is the official record of the courses, credits, and grades that a student has earned, can be obtained for free at the Office of the University Registrar (B7 Day Hall) or online at http://transcript.cornell.edu. For more information call (607) 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 towards the degree. At the beginning of fall term continuing students should check their updated worksheet online at http://human.cornell.edu/student/. It is important to check this document and bring any errors to the attention of the staff in the Office of the College Registrar (145 MVR). The academic integrity of these documents is maintained by members of the faculty.

**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 grade point average of 3.7 or above. No student who has received an F or U in an academic course will be eligible.

Kappa Omicron Nu seeks to promote graduate study and research and to stimulate scholarship and leadership toward the well-being of individuals and families. As a chapter of a national honor society in the New York State College of Human Ecology, it stimulates and encourages scholarly inquiry and action on significant problems of living—at home, in the community, and throughout the world.

Students are eligible for membership if they have attained junior status and have a cumulative average of B or higher. Transfer students are eligible after completing one year in this institution with a B average. Current members of Kappa Omicron Nu elect new members. No more than 10 percent of the junior class may be elected to membership and no more than 20 percent of the senior class may be elected. Graduate students nominated by faculty members may be elected. The president of Kappa Omicron Nu has the honor of serving as First Degree Marshall for the college during May commencement.
Bachelor of Science with Honors recognizes outstanding scholastic achievement in an academic field. Programs leading to a degree with honors are offered to selected students by the Department of Human Development and the Division of Nutritional Sciences. For contributing 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 Services (172 MVR) during their sophomore year or the first semester of their junior year. Honors candidates must have a minimum grade point average 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 the 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 the growth and self-fulfillment of future generations.” The recipient will receive 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 better 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 field work 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 a unique 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 Textiles and Apparel, the Design League welcomes people of all majors and schools.

Students have opportunities to work throughout the community in a variety of service capacities. They volunteer in day care centers, youth programs, health-related agencies, services for elderly people and people with disabilities, as well as nutrition programs, arts organizations, and Ithaca schools. For further information, contact the Public Service Center (200 Barnes Hall). Call 255-1148 for information about volunteer work or 255-1107 for information about work-study arrangements.

The Human Ecology Ambassadors is a group of Human Ecology undergraduates who assist the Office of Admissions 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 Admissions.

For information, contact the Office of Admission, Student, and Career Services (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 serves as Voices adviser from the Office of Admission, Student, and Career Services (172 MVR, 255-2832). The Human Ecology Mature Students Association is an organization of students who are 24 years of age or older at the time of matriculation. Many mature students need to balance family, work, and other concerns with their academic efforts. The Mature Students Association strives to help by providing a forum for resource exchange and referral, support, socializing, and special projects depending upon expressed interest. These goals are pursued through seminars and informational meetings, the mature students liaison, supplementary orientation activities, liaison with other university offices, and the encouragement of informal networking. Contact Patti Papapietro in the Office of Admission, Student, and Career Services (172 MVR) for more information.

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:

• participating in admissions hosting programs and conducting high school visits.
• sponsoring presentations on career and graduate school outcomes of a Human Ecology education.
• providing volunteer services to the Cornell and Ithaca communities.
• attending regular meetings and hosting annual fall and spring forums.

Contact Veredne Lee in the Office of Admission, Student, and Career Services (172 MVR, 255-2532) for more information.

The Pre-Law 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 sessions with current law students. Guest speakers include practicing attorneys, law faculty, and current law school students. Contact Kelly Deasy in the Office of Admission, Student, and Career Services (172 MVR, 255-2532) for more information.

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 healthcare 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. Contact Paula Jacobs in the Office of Admission, Student, and Career Services (172 MVR, 255-2532) for more information.

The Orientation Committee consists of students and advisers interested in planning and implementing programs to acquaint new students with the College of Human Ecology. The committee is particularly active at the beginning of each semester and is always eager for new members. For information, contact Patti Papapietro in the Office of
Admission, Student, and Career Services (172 MVR, 255–2532).

Membership in the Sloan Student Association is open to students interested in health care and related fields. Contact the president of the association (N222 MVR, 255–8015) for more information.

The Students for Gerontology (SFG) is composed of students from a wide variety of majors who are interested in health care and related fields. Programs sponsored by this organization focus on developing linkages with community organizations and other student gerontology groups. SFG meets monthly. Contact Nancy Wells, faculty adviser, Bronfenbrenner Life Course Center. (E220 MVR Hall, 254–6330), for further information.

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 further information contact Gail Canterbury (335 MVR, 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 and revised courses, and new course approval.

Students also have the opportunity to serve on the Admissions Policy Subcommittee and the Academic Integrity Hearing Board.

The Selection Committee for the Chancellor's Award for Excellence in Teaching or Professional Service handles the nomination and selection process for this prestigious yearly award. The committee consists of three teaching faculty members, one professional staff member, and three undergraduate members.

The Human Ecology Alumni Association Board of Directors includes two student board members—one junior and one senior. One student is selected each spring to begin a two-year term as student representative.

The two students co-chair the board's Student Activities Committee, which works to increase the visibility of the Alumni Association among the student body by linking the various student 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. The 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 100 Critical Reading and Thinking

Fall, spring, or summer. 2 credits.

The objective of this course is to enable students to increase critical reading and thinking abilities. Theory and research associated with a wide range of reading, thinking, and learning skills are examined. Emphasis is placed on developing and applying analytical and evaluative skills. Laboratory instruction is individualized and provides the opportunity to focus intensively on increasing comprehension, reading rate, and vocabulary.

HE 101 College Achievement Seminar

6-week summer session. 2 credits.

Enrollment limited to pre-freshman Summer Program students. Letter or S-U grades.

The objective of this course is to improve 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 201 Collaborative Leadership

Spring. 3 credits. Letter only. Lecture and section T R 840-9:55. B. Bricker.

Introduces the principles of leadership theory and practice of leadership. More information on this course is available at the Courses of Study web site: http://cuiinfo.cornell.edu/Academic/Courses/

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 470, HE 480 and HE 490 or HE 495. 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 406 Fieldwork in Diversity and Professional Practice

Summer. Variable credits.

Over the course of an eight-week summer session, students participate in a community-based medical center or clinic, and as a member of New York Presbyterian Hospital and Weill Medical College of Cornell University. This is a four-day internship and one day of seminars per week.

HE 470 Multicultural Issues in Urban Affairs

Fall and spring. 3 credits.

Students must take this course during the semester they participate in the Urban Semester Program. This course 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 the many neighborhoods and speak with local leaders about various 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 480 Communities in Multicultural Practice

Fall and spring. 6 credits.

Students must take this course during the semester they participate in the Urban Semester Program. This course is about 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 490 Multicultural Practice

Fall and spring. 6 credits.

Students must take either HE 490 or HE 495 during the semester they participate in the Urban Semester. Which is appropriate depends on the student's placement and will be determined by the Urban Semester director. 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 495 Culture, Medicine, and Professional Practice in a Diverse World

Fall and spring. 6 credits.

Students must take either HE 490 or HE 495 during the semester they participate in the Urban Semester. Which is appropriate depends on the student's placement and will be determined by the Urban Semester director. 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 throughout the semester. Medical and health-related practitioners make presentations throughout the semester.
A studio course in three-dimensional design with an interior design emphasis. Problems in spatial organization are explored through drawings and models.

**DEA 111 Making a Difference: By Design**
Students from all areas may examine how design affects their daily lives and future professions. This course focuses on issues of leadership, creative problem-solving, and risk-taking through case study examination of leaders in business, education, medicine, human development, science, and other areas who have made a difference using design as a tool for positive social change. Utilizing a micro to macro framework, students explore the impact of design from the person to the planet. Additional topics include: nurturing innovation, visual literacy, design criticism, design and culture, semiotics, proactive/reflective decision making, and ecological issues. Note: this course has evening exams.

**DEA 115 Design Graphics and Visualization**
Spring, 3 credits. Limited to 18. Option I DEA majors only. Prerequisite: DEA 101; must take DEA 102 and DEA 115 concurrently. Minimum cost of graphic supplies, $150; lab fee, $10. M W F 9:05-11:00. K. Gibson.
An introductory studio course for interior designers. Orthographic and perspective drawing and formal and conceptual presentation methods are emphasized, using both manual and digital means. Graphic and design concepts are reinforced through projects, readings, and field trips. Visit the course web site at http://instruct1.cit.cornell.edu/courses/dea115.

**DEA 120 Introduction to Human-Environment Relations**
This course analyzes the physical environment and human behavior. We examine the interface of social and environmental sciences with application for the design and management of built and natural habitats. Topics include environmental effects on health, mental health, aesthetics, performance, interpersonal relationships, and organizational effectiveness as well as the ecological consequences of human attitudes and behaviors. Hands-on discussion sections and two projects plus exams. Visit our web site at http://instruct1.cit.cornell.edu/courses/dea120.

**DEA 201 Design Studio III**
Fall, 4 credits. Limited to Option I DEA students. Prerequisite: DEA 111 and 115 (minimum grades of B-). Recommended: DEA 111 and 115. Coregistration in DEA 251 is required. Minimum cost of materials, $150; lab fee, $40; required field trip, $120. M W 12:20-4:25. J. Jennings.
This is the third semster in the studio sequence of eight semesters. The theme and objectives in this course are critical thinking, introducing means by which students can think, draw, write, and build their way critically through design. Taken concurrently with DEA 251, the course applies historical theory to design projects. The course also includes a collaborative project with a professor and students from another design discipline. Visit our web site at http://instruct1.cit.cornell.edu/courses/dea201.
DEA 251 History and Theory of the Interior
Fall. 3 credits. Limited to 35. Priority given to DEA majors. M W 8:40–9:55. J. Jannings. 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 twentieth century and isolate cultural patterns, spatial ideas, dialectics, design elements, and theorists. Reading, discussion, analytical exercises, essays, and a field trip will be included. Visit http://insruct1.cit.cornell.edu/courses/dea251.

DEA 300 Special Studies for Undergraduates
Fall or spring. Credit to be arranged. 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 a form available from the College Registrar’s Office. The form, signed by both the instructor directing the study and the head of the department, is filed at course registration or during the change-of-registration period.

DEA 301 Design Studio V
Fall. 4 credits. Prerequisites: DEA 111, 150, 201, 202, 203, and 204. Corequisite: DEA 303 and 459. Minimum cost of materials $50; field trips, $50. F 9:05–11:00. R. Gilmore. A continuous dialogue between the idea for an interior space and the reality of its final built form is contained within construction documents also known as working drawings and specifications. In this course students study the history of architectural documentation; the organization of construction drawings, schedules, and specifications; and the detailing of interior elements and construction methods by touring a local millwork shop. Each student completes a comprehensive set of construction documents for the renovation of an existing conference facility located on the Cornell campus.

DEA 325 Human Factors: Ergonomics–Anthropometrics
Fall. 3 credits. Recommended: DEA 150. T 8:40–9:55. A. Hedge. Implications of human physical and physiological characteristics and limitations on the design of settings, products, and tasks. An introduction to engineering anthropometry, biomechanics, control/display design, work physiology, and motor performance. Course includes practical exercises and field project work. Visit web site at http://ergo.human.cornell.edu. This course is the undergraduate section of DEA 201, which shares the same lectures but meets for an additional hour. DEA 651 has additional readings and projects.

DEA 350 Human Factors: The Ambient Environment
Spring. 3 credits. Recommended: DEA 150. T R 8:40–9:55. A. Hedge. An introduction to human-factor considerations in lighting, acoustics, noise control, indoor air quality and ventilation, and the thermal environment. The ambient environment is viewed as a support system that should promote human efficiency, productivity, health, and safety. Emphasis is placed on the implications for planning, design, and management of settings and facilities. Course includes a field project. This course is the undergraduate section of DEA 652, which shares the same lectures but meets for an additional hour. DEA 652 has additional readings and projects. Visit web site at http://ergo.human.cornell.edu.

DEA 304 Introduction to Professional Practice of Interior Design
Spring. 1 credit. F 12:20–2:15. A. Bassinger. Introduction to the organizational and management principles for delivery of interior design and facility management services. Covers basic organizational structures and basic management functions within interior design and facility management organizations, workflow and scheduling, business practices, legal and ethical responsibilities and concerns; contracts, basic contract documents such as working drawings and specifications, supervision of construction and installation, and cost estimation.

DEA 305 Construction Documents and Detailing
Spring. 2 credits. Prerequisites: DEA 301 and DEA 303. Corequisite: DEA 302. Minimum cost of materials $50; field trips, $50. F 9:05–11:00. R. Gilmore. A continuous dialogue between the idea for an interior space and the reality of its final built form is contained within construction documents also known as working drawings and specifications. In this course students study the history of architectural documentation; the organization of construction drawings, schedules, and specifications; and the detailing of interior elements and construction methods by touring a local millwork shop. Each student completes a comprehensive set of construction documents for the renovation of an existing conference facility located on the Cornell campus.

DEA 306 deadliest Information and Resources
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 307 Design Studio VII
Fall. 5 credits. Prerequisites: DEA 302, 303, 304, and 305. Minimum cost of materials, $150; field trip $50. T R 12:20–4:25. R. Gilmore. A comprehensive historic preservation design studio in which students complete each phase of the adaptive re-use of a structure in central New York. Working with real buildings and real clients, students research the market, complete a building assessment, and then design new uses for older structures. 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 document, code compliance, concept development, schematic and design development presentations, and construction documents.

DEA 308 Design Studio VIII
Fall. 5 credits. Prerequisites: DEA 301, 302, 303, and 304. Minimum cost of materials, $150. M W 12:20–4:25. 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 422 Ecological Literacy and Design (also ARCH 464.01)
Spring. 3 credits. Letter grade only. Field trips approximately $25. T R 10:10-12:05. J. Elliott.
This is a 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://instruct1.cit.cornell.edu/courses/dea422/.

DEA 423 Restaurant Design Charrette
Spring. 1 credit. Limited to 18. Permission of instructor. Letter grade only. Minimum cost of materials $50. 4 class meetings on Friday evening (week 1) 6-10 P.M.; one complete weekend (week 2) 6-10 P.M. S 9:00 A.M.—10:00 P.M. and Sunday 10:00 A.M.—8:00 P.M. R. Gilmore, S. Robson.
This intensive weekend long course pushes the boundaries of current restaurant design by developing a concept plan for an innovative restaurant in a non-traditional setting. Students work in teams to design development solutions and prepare design presentations for review by course instructors and visiting design professionals.

DEA 430 Furniture as a Social Art
Spring. 3 credits. Limited to 15. Permission of instructor. Cost of building materials: $150. Students must also sign up for 2 hours of DEA shop time each week for model building. M W 9:05-11:00. P. Eshelman.
This course examines furniture as a design process that emphasizes support of human behavior. Information about specific social issues including health care, aging, child care, and education is the starting point for assignment of various criteria to the design of products currently available and design new furniture. Also covered are furniture materials, fabrication processes, and manufacturing techniques.

DEA 451 Introduction to Facility Planning and Management
Fall. 1 credit. Letter grades only. T 3:35-4:25. F. Becker.
An introduction to the field of facility planning and management. The course is framed around the concept of organizational ecology and how the planning, design, and management of an organization's physical facilities can help it meet its business objectives. Topics covered include the history of the field, strategic planning, organizational trends, space planning and design, project management, building operations, workplace change management, real estate, furniture systems, and computer-aided facility management systems.

DEA 453 Planning and Managing the Workplace
This course focuses on key issues related to the planning, design, and management of the workplace. These issues include understanding the factors that lead organizations to plan and implement the workplace strategies they do; the nature of these different workplace strategies; and their effects on individuals, teams, and the organization as a whole.

DEA 454 Facility Planning and Management Studio
For advanced undergraduates interested in facility planning and management. Purpose is to provide basic knowledge, and concepts useful in planning, designing, and managing facilities for large, complex organizations. The course covers strategic and tactical planning for facilities, organizing to deliver facility management services, project management, space forecasting, space allocation policies, programming, relocation analysis, site selection, building assessment, space planning and design, furniture specifications, and moves. Sociopsychological, organizational, financial, architectural, and legal factors are considered. Visit http://courseinfo.cit.cornell.edu/courses/dea454_654.

DEA 455 Research Methods in Human-Environment Relations
Fall. 3 credits. Limited to DEA majors or permission of instructor. Prerequisite: a statistics course. M W 1:25-2:40. N. Wells.
The course develops the student's understanding and competence in the use of research and analytical tools to study the relationship between the physical environment and human behavior. Emphasis is placed on selection of appropriate methods for specific problems and the policy implications derived from research. Topics include research design, unobtrusive and obtrusive data-collecting tools, the processing of quantitative and qualitative data, and effective communication of empirical research findings.

DEA 459 Programming Methods in Design
Fall. 3 credits. Letter grade only. Minimum cost of materials, $100. T R 10:10-11:25. L. Maxwell.
Introduction to environmental programming. Emphasis on formulation of building requirements from user characteristics and limitations. Diverse methods for determining characteristics that will enable a particular environment setting to support desired behaviors of users and operators. Methods include systems analysis, soft system, behavior circuit, behavior setting, and user characteristic approaches. Selection of appropriate methods to suit problems and creation of new methods or techniques are emphasized. Visit http://instruct1.cit.cornell.edu/courses/dea/459_050.

DEA 460 Design City
Fall. 1 credit. S-U grades only. Restricted to DEA majors only. Required fee of approx. $150 includes hotel and chartered bus. R F all day, both days. K. Gibson, J. Jennings.
Field study of contemporary city 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. May be repeated for credit. Freshmen may not take course for credit. Visit web site at http://instruct1.cit.cornell.edu/courses/dea460.

DEA 470 Applied Ergonomic Methods
Spring. 3 credits. Prerequisite: DEA 325. T R 2:55-4:10. A. Hedge.
This course covers ergonomics methods and techniques and their application to the design of modern work environments. Emphasis is placed on understanding key concepts. Coverage includes conceptual frameworks for ergonomic analysis, systems methods and processes, a repertoire of ergonomics methods and techniques for the analysis of work activities and work systems. This course is the undergraduate section of DEA 670, which shares the same lectures but meets for an additional hour. DEA 670 has additional readings and projects.

DEA 472 Environments for Elders: Housing and Design for an Aging Population
Fall. 3 credits. Field trip fee $20. T 1:25-4:25. 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 web site at http://instruct1.cit.cornell.edu/courses/dea472.

DEA 499 Senior Honors Thesis
Fall or spring. Variable credit. Prerequisite: permission of thesis adviser and DEA director of undergraduate studies. Letter grades only. This is an opportunity for DEA majors to undertake original research and scholarly work leading to the preparation of a thesis. Students work closely with their thesis adviser on a topic of interest.

DEA 600-603 Special Problems for Graduate Students
Fall or spring. Credit to be arranged. S-U grades optional. Department faculty, independent advanced work by graduate students recommended by their special committee chair and approved by the head of the department and instructor.

600: Special Problems. For study of special problems in the areas of interior design, human environment relations, or facilities planning and management.

601: Directed Readings. For study that predominantly involves library research and independent study.

602: Graduate Empirical Research. For study that predominantly involves collection and analysis of research data.

603: Graduate Practicum. For study that predominantly involves field experiences in community settings.

DEA 645 Dancing Mind/Thinking Heart: Creative Problem-Solving Theory and Practice
Spring. 3 credits. Limited to 24 graduate and advanced undergraduate students. Prerequisite for undergraduates: permission of instructor. M 4:30-7:30. S. Danko.
Focuses on thinking processes and techniques that support creative problem solving. Theories of creative behavior and critical thinking are examined. 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 personal, 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 648 Advanced Applications in Computer Graphics**  
Fall. Variable credit (maximum 4). Limited to 15 graduate and advanced undergraduate students. Prerequisites for undergraduates: DEA 302 or permission of instructor. Minimum cost of materials $150. Lab fee, $35. T R 9:05–12:05, K. Gibson. Advanced use of computer technology to create and analyze interior environments. Emphasis is on the use of 3-D modeling, animation, photorealistic rendering, and emerging technologies to investigate dynamic design issues.

**DEA 650 Programming Methods in Design**  
Fall. 4 credits, T R 10:10–11:25, L. Maxwell. A course intended for graduate students who want a more thorough grounding in human factors than is provided by DEA 459. This course focuses on key issues related to the planning, design, and management of the workplace. These issues include understanding the factors that lead organizations to develop and implement the workplace strategies they do; the nature of these different workplace strategies; and their efforts as individuals, teams, and an organization. Course includes an additional one-hour discussion section each week for graduate students.

**DEA 654 Facility Planning and Management Studio**  

**DEA 656 Research Methods in Human-Environment Relations**  
Fall. 4 credits. DEA majors only or permission of instructor. Prerequisite: a statistics course. M W F 1:25–2:15, 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 455. Each student is required to attend DEA 455 lectures, meet with the instructor and other graduate students for an additional class each week, and complete additional readings and projects. See DEA 455 for more detail.

**DEA 659 Introduction to Facility Planning and Management**  
Fall. 1 credit. For graduate students interested in careers in facility planning and management. Letter grades only. T 3:35–4:25, F. Becker. Series of seminars led by Cornell faculty members and other professionals directly involved in facility planning and management. Topics include strategic and tactical facility planning, space standards, project management, computer and facility management, facility maintenance and operations, energy conservation, and building systems. Visit http://instruct1.cit.cornell.edu/courses/dea459-650.

**DEA 660 The Environment and Social Behavior**  
Fall. 4 credits. Prerequisite: DEA 150 and written permission of instructor. Field trip fee, $65. T R 9:05–12:05, G. Evans. This course is focused on social and personal variables that moderate the impacts of the built environment on human behavior. Social and cultural context, gender, physical health, and the life course are the principal moderating variables examined. The course is focused on a collaborative assignment with the design studio working for a real, not-for-profit client. Students in DEA 660 function as behavioral consultants, developing design guidelines based on user observation, readings and lecture, and personal experience. We also provide feedback on interior design products. Multiple field trips and an output evaluation of designs different from the collaborative project also occur.

**DEA 668 Design Theory and Criticism Seminar**  
Spring. 4 credits. Enrollment limited to 15 students. T R 10:10–11:25, J. Jennings. For advanced undergraduate and graduate students. This seminar explores two methods of design thinking, theoretical and critical. One method stems from a desire to understand historical theory and to assess the relevance of theory as an intellectual basis for contemporary design. The other approach involves learning to write critically. Within this context is the notion that every design is an argument a designer makes.

**DEA 670 Applied Ergonomics Methods**  
Fall. 4 credits. Enrollment limited to 20. Prerequisite: DEA 651. T R 2:55–4:10, A. Hedge. Intended for graduate students who want a more thorough understanding of applied ergonomics methods than is provided by DEA 470. Each student is required to attend DEA 470 lectures, meet with the instructor and other graduate students for an additional class each week, and complete additional readings and projects. See DEA 470 for more detail.

**DEA 682 Environment and Social Welfare**  
Fall. Variable credit (maximum 4). Prerequisite: a social science course. S-U grades optional. Department graduate students.

**DEA 699 Master's Thesis and Research**  
Fall or spring. Credits to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional. Department graduate faculty.
HD 220 The Human Brain and Mind: Biological Issues in Human Development (form. HD 221)  
This course introduces the biology that underlies human behavior and cognition. Processes like language, reasoning, decision making, and emotion. After studying fundamental concepts in neurobiology and neuroanatomy, the course explores a variety of topics, including how our brain underlies our perception, thought, language; emotions, memories, and desires. Relevant human clinical disorders are discussed throughout.

HD 230 Cognitive Development (also COGST 230)  
This course examines psychological data and theories that shed light on the practical issues that arise when children enter the legal arena. It attempts to integrate theories, research, and methodology from several areas of psychology including, developmental, cognitive, social, and clinical. This course also attempts to examine the degree to which basic research can (and should) be used to solve applied issues. The topic of children and the law provides an opportunity to meet all these requirements. Rapid changes involving child witnesses in our legal system have forced social scientists to bring their work into the courtroom. At the same time, bringing this fray into the legal system has changed the course of research and thinking about certain aspects of child development and cognition. It has encouraged researchers to tackle new issues and to develop innovative experimental paradigms. Selected topics to be covered 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 will be presented to illustrate the application of scientific data to the courtroom. Because of the heavy use of case materials; 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 238 Thinking and Reasoning (also COGST 238)  
Fall. 3 credits. Prerequisite: HD 115 or PSYCH 101. T R 2:55-4:10. B. Koslowski.  
Examines the topics of problem solving, transfer, and creativity: pre-causal and causal reasoning; models of good thinking based on formal logic, pragmatism, stochastics, 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. One is the extent to which children and adults approximate the sorts of reasoning that are described by various types of psychological models. The other is the extent to which various models, perception to describe the kind of thinking that is actually required by the problems and issues that arise and must be dealt with in the real world.

HD 241 History of Childhood in the United States (also HIST 271, AM ST 241)  
An examination of childhood and adolescence in various historical contexts: Puritan New England, slave plantations, evangelical revivals, the Western frontier, Victorian families, reform schools, early high schools and colleges, the sexual revolution of the 1920s, immigrant communities, the Depression and World War II, the 1960s, recent social and cultural changes affecting families. Students will evaluate continuities and changes in the lives of American children as well as changing scientific ideas about children. Students have an opportunity to reflect on and write about their own childhood and adolescence. This course is designed to give students a humanities perspective on approaches to childhood.
from a life course perspective. Topics to be covered include: 1) an introduction to the field of gerontology, its history, theories, and research methods; 2) a brief overview of the physiological and psychological changes that accompany aging; 3) an analysis of the contexts (such as family, friends, social support, employment, volunteer work) in which individual aging occurs, including differences in gender, ethnicity, and social class; 4) and the influences of society on the aging individual.

**HD 253 Gender and the Life Course (also FGSS 253)**

Fall. 3 credits. S-U grades optional. TBA. Not offered 2004–2005. Staff.

We will examine the complex interplay between gender and age as well as the social construction of the life course. Students explore the relationship between social change and individual lives, observing the significance of two key institutions—work and family—in shaping basic life choices and their consequences throughout the life course. Implications of key life trajectories and transitions for individual lives and for social policy will also be discussed.

**HD 258 History of Women in the Professions, 1800 to the Present (also FGSS 239 and HIST 239, AM ST 258)**


Covers the historical evolution of the female professions in America (midwifery, nursing, teaching, librarianship, home economics, and social work) as well as women's struggles to gain access to medicine, law, and the sciences. Lectures, reading, and discussions aim to identify the cultural patterns that fostered the conception of gender-specific work, and the particular historical circumstances that created these different work opportunities. The evolution of "professionalism" and the consequences of professionalism for women, family structures, and American society are also discussed.

**HD 260 Introduction to Personality (also PSYCH 275)**

Spring. 3 credits. Limited to 600 students (300 HD 260, 300 PSYCH 275). Recommended: introductory course in psychology or human development. T R 1:25–2:40. Staff.

This course is designed as an introduction to theory and research in the area of personality psychology, with special emphasis on personality development. It covers the major influences—including genetic, environmental, and gene-environment interactions—and involves in-depth study of the major theories. The assumptions and models of human behavior that form the basis of each theoretical orientation are examined and compared, and the relevant empirical evidence reviewed and evaluated. In addition, basic psychometric concepts and the methods for measuring and assessing personality are covered, as are the major related debates and controversies.

**HD 261 The Development of Social Behavior**

Spring. 3 credits. Strongly recommended: HD 115 or PSYCH 128. T R 1:25–2:40. Staff.

Issues in the development of social behavior are viewed from the perspective of theory and research. Likely topics include bases of social behavior in infancy and early childhood, the role of parents, siblings, and peers, the development of prosocial and aggressive behavior, the development and functioning of attitude and value systems, and the function and limits of experimental research in the study of social development.

**HD 266 Emotional Functions of the Brain**


Much of our social behavior, and what we refer to as personality, is related to phylogenetically-old emotional systems that help us to adapt to critical stimuli in the environment. These systems are structured and organized within the brain, but they are also capable of being modified by our everyday experiences. After an overview of the gross structure of the brain and the physiological and psychological changes that accompany aging, we will examine the complex interplay between an individual's development and the functioning of specific emotional systems. Then the focus of the course concerns neurological and psychological differences of gender, ethnicity, and social class; and the influences of society on the aging individual.

**HD 327 Field Practicum I (also PSYCH 327)**

Fall. 3 credits. Enrollment limited to 30 students. Students must commit to taking HD 328 in the spring semester. Prerequisites: HD 370 or PSYCH 325 and permission of instructor. Letter grades only. M W 8:40–9:55. H. Segal.

See PSYCH 327 for course description.

**HD 328 Field Practicum II (also PSYCH 328)**

Spring. 3 credits. Enrollment is limited to 30 students. Prerequisites: HD 370 or PSYCH 325 taken the previous term. Letter grades only. M W 8:40–9:55. H. Segal.

See PSYCH 328 for course description.

**HD 336 Connecting Social, Cognitive, and Emotional Development**

Fall. 3 credits. Prerequisites: HD 115 or PSYCH 101. Students may not concurrently register with HD 327 or HD 328 or PSYCH 327 or PSYCH 328. Letter grades only. M W 11:40–12:55. H. Segal.

This course introduces students to theories, empirical scholarship, public policies, and current controversies regarding lesbian, gay, bisexual, transgender, and other gender and sexual minority populations. The major focus is on sexual development, lifestlyes, and communities with additional emphasis on ethnic, racial, and gender issues. Videos supplement the readings and lectures.

**HD 343 Infant Behavior and Development**

Fall. 3 credits. Prerequisites: HD 115; a biology course, any level, but no anatomy course. Not open to freshmen. Limited to 60 students. M W F 1:25–2:15. S. Robertson.

Behavior and development from conception through the first two years of life is examined in traditional areas (e.g., perception, cognition, socioemotional theory, language, motor function). The fundamental interconnectedness of these aspects of development is strongly emphasized, as is their relation to the biology of fetal and infant development. Topics with implications for general theories of development are emphasized (e.g., the functional significance of early behavior, the nature of continuity and change, and the role of the environment in development). Conditions which put infants at risk for poor development (e.g., premature birth, exposure
to environmental toxins, maternal depression) and topics with current social, ethical, or political implications (e.g., infant day care, fetal rights) are also considered. An emphasis on research methodology in the study of early behavioral and development is maintained throughout the course.

HD 346 The Role and Meaning of Play
Fall. 3 credits. Limited to 30 juniors and seniors. Prerequisite: HD 115. M 7:30–10:00. J. Ross-Bernstein.

The aim of this course is to examine 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 and play the value of each, and the effect of the environment in enhancing and supporting play.

HD 347 Human Growth and Development: Biological and Behavioral Interactions (also B&SOC 347 and NS 347)
Spring. 3 credits. Prerequisites: HSO G 101 or 109 or equivalent, and HD 115 or PSYCH 101. Limited to 150 students. M W F 1:25–2:15. Offered alternate years. S. Robertson and J. Haas.

This course is concerned with the interrelationships of physical and psychological growth and development in humans during infancy. Intrinsic and extrinsic causes of variations in growth, including various forms of stimulation, are considered. In addition, the consequences of early growth and its variations for current and subsequent behavioral, psychological, and physical development are examined. The interaction between physical and behavioral or psychological factors is emphasized throughout the course.

HD 348 Advanced Participation with Children

An advanced, 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. Students are expected to do a presentation and paper on a self-selected topic within the scope of the class. 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 353 Risk and Opportunity Factors in Childhood and Adolescence
Fall. 3 credits. Enrollment limited to 100 students. Prerequisites: HD 115 and HD 250. S-U grades optional. M W F 10:10–11:10. J. Garbarino.

This course explores the meaning of risk and opportunity in the lives of children and youth. It begins with understanding risk accumulation and resilience as they relate to social policy, professional practice, and community development. The concept of "social toxicity" is a central theme of the course. Assignments include writing research-based editorials and participating in a simulated public policy debate.

HD 362 Human Bonding
Fall. 3 credits. Limited to 600 students. Recommended: introductory course in psychology or human development. S-U grades optional. T R 1:25–2:40. C. Hazan.

Covers the scientific research that examines the nature of human affectional bonds, including their functions and dynamics. Covers such topics as interpersonal attraction and mate selection, intimacy and commitment, love and sex, jealousy and loneliness, the neurobiology of affiliation and attachment, and the role of relationships in physical and psychological health.

HD 366 Psychobiology of Temperament and Personality
Fall. 3 credits. Letter grades only. Limited to 20 students. Prerequisite: HD 266 (no substitutions and no exceptions); permission of instructor required. M W 7:30–10:00. R. Depue.

This course is for students who have an interest in the neurobiology of behavior, in general, and in temperament and personality, in particular. The course material is presented within an evolutionary biology perspective, where the development of neurobehavioral systems as a means of adapting to critical stimuli is explored as the basis of emotional traits in humans. The nature of temperament and personality is explored from psychometric, social, genetic, and biological points of view. There is a focus on the general role played by the biogenic amines (dopamine, norepinephrine, and serotonin), corticotropic hormone and opiates in determining individual differences in temperament and personality. Implications for modeling several forms of personality disorders and psychopathology are also discussed. Finally, the manner in which environmental influences across the life span may be coded in the brain and influence the development of personality is explored.

HD 368 Children's Development in Different Cultures
Spring. 3 credits. Letter grades only. Prerequisites: HD 115 or PSYCH 101 and one college-level statistics course. M W 2:55–4:10. K. Greene.

This course examines the influence of ecological, cultural, and ethnic factors on the social and cognitive development of children in different cultures. Particular attention is given to research methodologies that guide us in making comparisons about parent-child development across cultures. Topics include family origin and universality, parental roles, child-family interaction, patterns of kinship, and economic and health issues.

HD 370 Adult Psychopathology (also PSYCH 325)
Spring. 3 credits. Limited to sophomores, juniors, and seniors. Prerequisites: any one course in psychology or human development. T R 10:10–11:25. H. Segal. See PSYCH 325 for course description.

HD 382 Research Methods in Human Development

The course reviews different methodological approaches in the study of human development. In particular, students learn about the research designs as well as different methods of data collection and analysis, with a focus on those methods used by the faculty in the HD department. Through lectures, discussions, assignments, computer labs, and two projects, students gain understanding of the strengths and limitations of experimental, quasi-experimental, survey, and qualitative research designs.

HD 400–401–402–403 Special Studies for Undergraduates
Fall or spring. Credits to be arranged (1–4). Permission required. S-U grades optional. 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 must submit a multipage description of the study they want to undertake, on a form available from the department office in NG14. This form must be signed by the instructor directing the study and the student's faculty advisor and submitted to NG14 MVR, the Office of Undergraduate Education. After the form is approved, the student takes the form to the College Registrar's Office, 145 MVR, along with an add/drop slip. To ensure review before the close of the periods, early submission of the special studies form to the Office of Undergraduate Education is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study.

400: Directed Readings. Permission required. For study that predominantly involves library research and independent study.

401: Empirical Research. Permission required. For study that predominantly involves data collection and analysis, or laboratory or studio projects.

402: Supervised Fieldwork. Permission required. For study that involves both research and a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

403: Teaching Assistantship. Enrollment limited to juniors and seniors with a minimum 3.0 GPA. Prerequisites: PSYCH 101, HD 115, or PSYCH 101, and two intermediate level HD courses, or equivalent courses in psychology or sociology. Students must have taken the course and received a grade of B+ or higher. Permission required. For study that includes assisting faculty with instruction.

HD 417 Female Adolescence in Historical Perspective (also FGSS 438, HIST 458, AM ST 417)
Spring. 3 credits. Limited to 25 students. Prerequisites: HD 216 and at least one 300-level history or women's studies or American studies course. Permission of instructor required. Juniors and seniors only. R 1:25–4:25. J. Brumberg.

A reading, writing, and discussion course that attempts to answer a basic historical question.
that has consequences for both contemporary developmental theory and social policy: how has female adolescence in the United States changed, if at all, in 200 years? The focus is on the ways in which gender, class, ethnicity, and popular culture shape adolescent experience. Although the required readings are primarily historical in nature, students are encouraged to think about the connections between biology, psychology, and culture. Students are required to do a primary source research paper. They will also be involved in events supporting the Johnson Museum Show "Girl Culture" in March 2004.

**HD 418 Aging: Contemporary Issues**


This seminar addresses major issues and controversies in the field of aging. It is designed for upper-level students who wish to pursue an in-depth analysis of concepts such as "successful" aging and wisdom, as well as controversies surrounding issues of generational equity and the right to die. Although these issues are addressed primarily from a psychological viewpoint, interdisciplinary perspectives are employed in both readings and discussions. The seminar is 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 primarily devoted to discussion of assigned readings.

**HD 419 Midlife Development**

Fall, 3 credits. Enrollment limited to 25 students. Letter grades only. Prerequisites: HD 218, 250 or 251 or permission of instructor. T R 2:55–4:10. Offered alternate years. S. Cornelius.

This seminar addresses the burgeoning research literature on adult development during midlife. The focus of the course is on research and theory examining psychological changes during middle adulthood such as relativistic and dialectical thought, personality, identity, and sense of control. It 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. The course is conducted in a seminar format for upper-level undergraduates. Oral presentations, class participation, and an integrative paper is required.

**HD 431 Mind, Self, and Emotion: A Research Seminar**

Fall, 3 credits. Enrollment limited to 20 students. Prerequisites: HD 115 or PSYCH 101, and one statistics course or HD 382. Letter grades only. M W 2:55–4:10. Offered alternate years. Q. Wang.

This course 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. Offered to upperclass undergraduate students and graduate students. Most applicable to those who are doing or planning to do research on these topics.

**HD 432 Cognitive, Social, and Developmental Aspects of Scientific Reasoning**

Spring, 3 credits. S-U grades optional. Prerequisites: HD 115 or PSYCH 101 or permission of instructor. T R 2:55–4:10. B. Koslosky.

This course examines the cognitive precursors of scientific reasoning, the way the precursors develop over time, and the way that the social context affects whether, and if so how, scientific inquiry is carried out.

**HD 433 Developmental Cognitive Neuroscience**


What are the brain mechanisms underlying human behavior and cognition? How do those mechanisms change across development? This course explores the development of brain mechanisms underlying human behaviors such as language, attention, and memory, as well as the brain mechanisms that underlie various developmental disorders such as developmental dyslexia, autism, and attention deficit (hyperactive) disorder (ADHD). 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 436 Language Development (also COGST 436, PSYCH 436 and LING 436)**

Spring, 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HD 635/LING 700. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, neuropsychology, biology, or linguistics. S-U grades optional. T R 8:40–9:50. Offered alternate years. Not offered 2004–2005. J. Hauagard.

This is an advanced course designed to explore the functioning of language acquisition. The first part of the course examines the nature of language and the questions that developmental cognitive neuroscience tries to answer and those we explore in this course. The course explores methods used in the field (including brain imaging techniques) and the development of brain mechanisms underlying human behaviors such as language, attention, and memory, as well as the brain mechanisms that underlie various developmental disorders such as developmental dyslexia, autism, and attention deficit (hyperactive) disorder (ADHD). 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 437 Lab Course: Language Development (also COGST 450, PSYCH 437 and LING 450)**

Spring, 2 credits. Prerequisite: HD/COGST/PSYCH/LING 436 or equivalent. R 1:25–2:40. B. Lust.

See COGST 450 for course description.

**HD 439 Cognitive Development: Infancy through Adolescence (also COGST 439)**


This course is an overview of current and classic issues and research in cognitive development. Central topics of both "hard cognition" (e.g., information processing and neuropsychological functioning) and "soft cognition" (e.g., problem solving, concepts, and categories) are covered. Selected topics are linked to methodological issues and to important social issues such as cross-cultural cognitive development and putative racial and social class differences.

**HD 440 Internship in Educational Settings for Children**

Fall or spring, 8–12 credits. Prerequisites: HD 115, 242, 251 or permission of instructor. HD 346. Permission of instructor required. S-U grades optional. J. Ross-Bernstein.

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 451 Nontraditional Families and Troubled Families**


This is an advanced course designed to explore the functioning of families. The first part of the course examines family system theory and how it relates to our understanding of all families. Four types of families are then examined: two nontraditional families (e.g., adoptive families) and two troubled families (e.g., families with a chronically ill child).

**HD 452 Culture and Human Development (also COGST 452)**


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, and linguistics, to understand human difference, experience, and complexity. It takes empirical reflections upon major developmental topics such as cultural aspects of physical growth and development, culture and cognition, culture and language: culture, self, and personality; cultural construction of emotion; culture issues of sex and gender; and cultural differences in pathology.

**HD 456 Families and Social Policy**

Spring, 3 credits. Prerequisite: one course in the area of the family or in sociology. S-U grades optional. TBA. Staff.

An examination of the intended and unintended family consequences of governmental policies, using case studies.
in areas such as social welfare, day care, and employment. The policy implications of changes in the structure and composition of families are also considered.

[HD 457 Health and Social Behavior (also SOC 457)]
Fall. 3 credits. Prerequisites: a course in statistics and one of the following: HD 250, SOC 101, SOC 251, or D SOC 101. Letter grades only. T R 10:10-11:25. Offered alternate years. Not offered 2004-2005. E. Wethington.

This course critically examines theories and empirical research on the relationships among social group membership, social status, and physical and mental health. The 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 458 Parent-Child Development in African-American Families
Fall. 3 credits. Letter grades only. Enrollment limited to 20 seniors and juniors. HD 115, HD 250, and a college level statistics course. T R 10:10-11:25. R. K. Greene.

This course examines parent-child relationships in African-American families. Topics include historical influences on contemporary parenting behaviors, the impact of societal forces on African American families' socialization practices, and the influence of parental child rearing beliefs, strategies, and practices on African-American child development. Particular attention is given to the relevance of mainstream theoretical formulations of African American's parental and familial functioning.

[HD 464 Adolescent Sexuality (also FGSS 467)]

This course covers topics selected by students regarding theoretical, research, and applied issues on adolescent sexuality. In the second half of the course students lead a class that focuses on a research topic of their choosing. The success of the course depends on students feeling personally engaged and committed to the course content. Students are expected to participate fully in the class discussions. Because of the multidisciplinary nature of the course, students from a variety of backgrounds in academic disciplines, gender, sexual orientation, ethnicity, race, class, and religious affiliation will be in the course.

HD 468 Stress in Childhood and Adolescence

This is an 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 covered represent current interest in lives of children (e.g. divorce of parents), which have potentially damaging consequences for development (e.g. child abuse). Topics in which faculty at Cornell have conducted significant research (e.g. children's memory for stressful events) are also covered. In addition to considering the negative effect of stress on development, we also consider issues of individual differences in stress reactivity, including theories and coping and resilience. These topics lead naturally into discussions of practice and policy.

[HD 471 Child Development and Psychopathology (also PSYCH 476)]

This class explores the development and process of mental, emotional, and behavioral disorders in children such as mental retardation, autism, depression, and attention deficit disorder. Topics include: 1) the classification of mental disorders; 2) biological, psychological, and sociological theories regarding the development and maintenance of mental disorders; 3) prevalence and etiology of childhood mental disorders, and 4) therapeutic and preventive interventions. If there is sufficient enrollment, an optional discussion section will be available to those students who would like an opportunity to discuss readings and lecture material in greater depth.

HD 482 Early Care and Education in Global Perspective

In this course we examine American child care and early education policies and programs, broadly defined, in the context of policies and programs in Africa, Asia, Europe, and Latin America. Comparison and analysis are guided by several complementary conceptual frameworks. Particular attention is given to the synthesis of child care with early intervention and family support. Policy-related topics include parental leave, developmentally appropriate practices, universal pre-kindergarten, cultural diversity, parent involvement, teacher preparation, and financing the ECE system. Students specialize in the child care policies and programs of another country, work in teams to analyze a contemporary policy issue, and apply course content to an ECE issue of their choice in a final paper.

HD 498 Senior Honors Seminar
Fall and spring. 1 credit. Required for, and limited to, seniors in the HD honors program. S-U grades only. M 12:20-1:10. R. K. Greene.

This seminar is devoted to discussion and presentation of honors theses being completed by the senior students.

HD 499 Senior Honors Thesis
Fall or spring. Credit to be arranged. Prerequisites: permission of adviser and coordinator of honors program. S-U grades optional. Department faculty.

HD 206, 306, 406 Topics in Human Development
2-4 credits. S-U grades optional. These topics vary each time the course is offered and are taught by advanced graduate students in the field of human development. Descriptions are available at the time of course registration. These courses do not fulfill any requirements for the major; they must be taken as electives.

Topics Courses
Fall or spring. 2-4 credits. Prerequisites and enrollment limits vary with topic being considered in any particular term. Permission of instructor may be required. This series of courses provides an opportunity for undergraduates to explore an issue, a theme, or research in the areas of departmental concentration. Topics vary each time the course is offered. Descriptions are available at the time of course registration.

Although the courses are usually taught as seminars, a subject may occasionally lend itself to self-taught, practicum, or other format.

HD 215, 315, 415 Topics in Adolescent and Adult Development
HD 235, 335, 435 Topics in Cognitive Development
HD 245, 345, 445 Topics in Early Childhood Development and Education
HD 255, 355, 455 Topics in Family Studies and the Life Course
HD 265, 365, 465 Topics in Social and Personality Development
HD 275, 375, 475 Topics in Developmental Psychopathology
HD 285, 385, 485 Topics in the Ecology of Human Development

The Graduate Program
HD graduate courses are open only to undergraduates with instructor's permission.

General Courses
HD 617 Adolescence
Fall. 3 credits. R. Savin-Williams.

Critical examination of seminal theoretical and empirical writings on adolescent development. Empirical research on specific questions chosen by students is considered in the light of these approaches.

HD 631 Cognitive Development
Fall. 3 credits. Letter grades only. Not offered 2004-2005. S. Green.

Faculty members involved in the course will present their area of specialization in cognitive development. These areas will include perception, attention, memory, language, thinking and reasoning, learning, creativity, and intelligence.

HD 632 Cognitive Neuroscience Seminar: Applications of Brain Science to Behavioral Research
Spring. 3 credits. Enrollment limited to 25 doctoral graduate students only. Master's graduate students and undergraduate students who are actively doing research may apply for entry. S-U grades optional. W 7:30-10:00 P.M. E. Temple.

This course gives graduate students the opportunity to learn about current methods of cognitive neuroscience and explore the ways cognitive neuroscience methods and current findings may impact their field of research. Initial meetings include foundational lectures on the fundamentals of cognitive neuroscience. Subsequent meetings cover current topics in cognitive neuroscience.
that will vary year to year depending on the research fields of the graduate students enrolled. Sample topics include cognitive neuroscience of false memory formation, sexual orientation, effects of trauma, and bilingualism. Students do not need to have had previous course work in neurobiology or cognitive neuroscience but rather to be actively engaged in planning or implementing their thesis research. Class format is graduate seminar with reading and discussion of research, student presentations, and papers.

**HD 640 Infancy**
Fall. 3 credits. TBA. Not offered 2004–2005. S. Robertson.
Development in infancy is examined through a critical review of key research and theory in selected aspects of neurobehavior, perception, cognition, language, emotion, and social relationships. Theoretical issues to be considered include the role of experiences in early development, sensitive periods, continuity and discontinuity in development, and the functional significance of early behavior. Some of the conditions that put infants at risk for poor development are also considered, such as premature birth, perinatal medical complications, and exposure to environmental toxins. The course combines perspectives from developmental psychology and psychobiology.

**HD 650 Contemporary Family Theory and Research**
Sociological and social psychological theories and research on the family are examined with reference to the relationship between the family and society. Topics change from year to year, focus on the processes of socialization and social control, the reproduction of gender and social class across generations, changes in family "values" across time, the rise of divorce and single motherhood, family diversity, and the genesis of deviance and psychological disorder.

**HD 660 Social Development**
Fall. 3 credits. Letter grades only. M 11:00–1:00. K. Greene.
This seminar examines literature relevant to early childhood determinants and developmental processes of personality and social behavior. Current research, theories, and methodological issues are addressed. Special emphasis is placed on possible interrelations between the quality of relationships with parents and with peers, and on the meaning of risk, vulnerability, and resilience in children's lives.

**HD 670 Experimental Psychopathology**
Spring. 3 credits. Prerequisite: an undergraduate course in abnormal psychology or psychopathology; a course in multivariate statistics; and substantive course work in neurobiology or related biological science. TBA. Not offered 2004–2005. Staff.
Overview of current theories and empirical research on functional and organically based psychological disorders. Topics covered include autism, schizophrenia, anxiety disorders, affective disorders, and personality disorders. Focus is on the developmental and etiology of psychopathology.

**HD 691 Poverty, the Life Course, and Public Policy (also DEA 691)**
Fall. 3 credits. Limited to 15 graduate students. Letter grades only. W 3:00–5:00. G. Evans.
See DEA 691 for course description.

**Topical Seminars**
Seminars offered irregularly, with changing topics and instructors. Content, hours, credit, and instructors to be announced. Seminars offer concentrated study of specific theoretical and research issues.

**HD 618 Seminar in Adolescence and Adult Development**
Topics include peer relations, relation-teen relationships, self-esteem, youth and history, work, and moral development.

**HD 633 Seminar on Language Development**
Topics include acquisition of meaning in infancy, precursors of language in early infancy, and atypical language development.

**HD 635 Seminar in Cognitive Development**
Topics include early attention, perception, memory, and communication. Assessment and intervention in relation to these processes will be considered when possible.

**HD 645 Seminar on Infant**
Focuses on selected topics in the developmental psychology and psychobiology of infancy (including fetal development). Special topics may vary and depend in part on student interests.

**HD 646 Seminar in Early-Childhood Development and Education**
Topics include analysis of models and settings, design of assessment techniques, program evaluation, and early childhood in a cross-cultural context.

**HD 655 Seminar in Family Studies and the Life Course**
Topics include the sociology of marital status, the single-parent family, work-family linkages, women and work, and families and social change.

**HD 665 Seminar in Personality and Social Development**
Focuses on selected issues related to personality and social development. The issues selected vary each year according to current importance in the field and student interests.

**HD 675 Seminar in Developmental Psychopathology**
Topics include learning disabilities, therapeutic interventions in atypical development, child abuse and maltreatment, family factors in the etiology of functional disorders, and cognitive characteristics of atypical groups.

**HD 685 Seminar in Research Methods**
This course focuses on quantitative and qualitative research methods frequently used in developmental psychology or life course studies, such as surveys, questionnaires, observations, and interviews.

**HD 690 Seminar on Ecology of Human Development**
Topics include the institutional setting as a determinant of behavior, the poor family, and the identification and measurement of ecological variables.
POLICY ANALYSIS AND MANAGEMENT

R. Burkhauser, chair; R. Avery, associate chair; E. Peters, director of graduate studies; A. Mathios, director of undergraduate studies; W. White, director of Sloan Program; B. Hollis, executive director of Sloan Program; C. Calon, associate director of Sloan Program; J. Allen, R. J. Avery, R. Battistella, B. Bristow, R. Burkhauser, J. Cawley, T. Delara, D. Barr, Emeritus; H. Biesdorf, Emeritus; M. Waller, W. White; R. Babcock, Emeritus; L. Street, Emeritus; B. L. Yerka, Emeritus; J. Robinson, Emerita; C. Shapiro, Emeritus; E. S. Maynes, Emeritus; C. McClintock, Emeritus; J. Mueller, Emeritus; L. Noble, Emerita; J. Robinson, Emeritus; C. Shapiro, Emeritus; L. Streeter, Emeritus; L. B. Yerka, Emerita; E. Ziegler, Emeritus.

Note: Class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

PAM 200 Intermediate Microeconomics
Fall or spring. 4 credits. Prerequisite: ECON 101 or equivalent. J. Cawley, B. Kirwan, A. Mathios, W. Rosen, staff. Topics include theories of demand and consumer behavior including classical and indifference curve analyses; theories of production and cost; models for the following markets—competitive, monopoly, monopolistic competition, oligopoly, and inputs; general equilbrium; welfare economics; public goods; and risk. A section is mandatory.

PAM 204 Economics of the Public Sector
Fall or spring. 3 credits. Prerequisites: PAM 200. S-U grades optional. D. Kenkel, K. Simon.

The public sector now spends nearly 2 out of every 5 dollars generated as income in the U.S. economy. A thorough knowledge and understanding of this important sector is an essential part of training in policy analysis and management. This course provides an overview of the public sector of the U.S. economy, the major categories of public expenditures, and the main methods used to finance these expenditures. The principles of tax analysis and cost-benefit analysis are presented with a focus on the role of public policy in improving economic efficiency, promoting the goals of equity and social justice, and improving equity by altering the distribution of wealth and income.

PAM 210 Introduction to Statistics
Fall or spring. 4 credits. B. Kirwan, K. Joyner, R. O'Neill, R. Swisher

This course introduces students to descriptive and inferential statistics. Topics include hypothesis testing, analysis of variance, and multiple regression. To illustrate these topics, this course examines applications of these methods in studies of child and family policy.

PAM 215 Research Methods
Fall or spring. 3 credits. Prerequisites: PAM 210 or equivalent. Sections TBA. J. Kuder, M. Waller.

This course introduces students to descriptive and inferential statistics. Topics include hypothesis testing, analysis of variance, and multiple regression. To illustrate these topics, this course examines applications of these methods in studies of child and family policy.

PAM 220 Introduction to Management: Principles and Differences Among Sectors
Fall. 3 credits. D. Tobias.

This course is a basic introduction to management and related concepts of planning, organizing, controlling, leadership, and special topics within five major management contexts including individual/personal, groups/families, firms, not-for-profit organizations, and governments/communities.

PAM 222 Controversies about Inequality (also SOC 222, ILRROB 222, PHIL 195, D SOC 222, and GOVT 222)
Spring. 1-3 credits. See SOC 222 for course description.

PAM 223 Consumer Markets
Fall. 4 credits. Offered alternate years. R. J. Avery.

A study of the structure and functions of consumer retail markets with emphasis on the role and activities of the major players in these markets—firms, consumers, and governments. The nature and consequences of various types of market failures are studied from each of these perspectives. Case studies and outside lecturers are used.

PAM 230 Introduction to Policy Analysis
Fall or spring. 4 credits. R. Avery, 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 consumer, health, and family/social welfare areas and also includes an introduction to the technical skills required to undertake policy analysis.

PAM 245 Neighborhoods, Families, and the Life Course
Spring. 3 credits. R. Swisher.

This course considers the social policy implications of research on the effects of geographic inequalities (e.g., neighborhood poverty) on individual and family welfare across the life course. It emphasizes the consequences of neighborhood poverty in adolescence, explores the long-term effects of these early experiences for outcomes later in the life course, and contrasts them to those of working-class, middle-class, and more advantaged peers. Policy implication discussions will include welfare reform, housing policy, racial and class segregation, the Moving to Opportunity demonstration program, school vouchers, and neighborhood programs aimed at promoting social capital and community policing.

PAM 300 Special Studies for Undergraduates
Fall or spring. Credit to be arranged.

Special arrangement for course work to establish equivalency for training in a previous major or institution. Students prepare a multipage description of the study they want to undertake on a form available from the College Registrar's Office. This form, signed by both the instructor directing the study and the head of the department, should be filed at course registration during the change-of-registration period.

PAM 303 Ecology and Epidemiology of Health
Fall. 3 credits. Limited to 50 students. S-U grades optional. E. Rodriguez.

Ecological and epidemiological approaches to the problems which restrict human health within the physical, social, and mental environment. The course introduces epidemiological methods and surveys the epidemiology of specific diseases such as AIDS, hepatitis. Legionnaires' disease, plague, cancer, herpes, and chlamydia. Application of epidemiology to health care will be discussed.

PAM 305 Introduction to Multivariate Analysis
Fall or spring. 4 credits. Prerequisites: PAM 210, AEM 210 or ILRST 210 or equivalent. W. Rossen.

This course introduces basic econometric principles and the use of statistical procedures in empirical studies of economic models. Assumptions, properties, and problems encountered in the use of multiple regression procedures are discussed. Students are required to specify, estimate, and report the results of an empirical model. Section meets once a week.

PAM 320 Intermediate Policy Management

PAM 323 Consumer Markets II
Spring. 4 credits. R. Avery.

This course focuses on the cognitive, behavioral, and environmental forces that drive consumer demand. The first half of the course draws on theories and concepts from psychology and focuses on the cognitive processes whereby consumers interpret market-provided information and other stimuli in the purchase environment. The second half of the course draws on theories and concepts from retail anthropology to explain the behavior of consumers in the in-store environment. Particular emphasis is placed on communication institutions (advertising, television, print media), their impact on consumer decision making, and their control through government regulation. Course format is highly audio-visual and incorporates guest lectures from prominent consumer product firms, advertising agencies, and government regulators.

PAM 330 Evaluation of Public Policies
Spring. 3 credits. D. Kenkel.

This course focuses on the economic evaluation of health and safety policy. The first third of the course assesses the symptoms and frames the policy problem (key steps in any policy analysis). Topics include: the so-called economic costs of illness; the World Health Organization's global risk assessment and estimates of the burden of disease; and the relevance of market failures to individual health decisions. The second third of the course covers specific evaluation methods.
in detail: cost-benefit analysis of policies to reduce health risks related to the environment, traffic safety, occupational safety, guns, tobacco, and alcohol; and cost-effectiveness analysis to evaluate clinical, pharmaceutical, and public health interventions. The last third of the course discusses the use and abuse of economic evaluation methods in current practice.

[PAM 334 Corporations, Shareholders, and Policy]
This course 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. The costs and benefits of the corporate form of organization are examined. The legal institutions defining the corporation, 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, voting by shareholders, and outside directors on the board, the role of large investors, and executive compensation plans. Additional topics include government ownership of corporations and non-profit enterprises.

[PAM 340 The Economics of Consumer Policy]
Spring. 4 credits. Prerequisites: ECON 101 or equivalent. S-U grades optional.
This course is designed to familiarize students with the economic analysis of consumer policy issues. It uses the tools of microeconomics to investigate the interaction between government and the marketplace, with an emphasis on how that interaction affects consumers. The rationale for and effects of regulation of industry are examined. Alternative theories of regulation are considered, including the capture of economic, and public interest theories. Those theories are applied to specific types of regulation, including economic regulation of specific industries (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 341 Economics of Consumer Law and Protection]
Fall. 3 credits. Prerequisite: ECON 101 or equivalent. S-U grades optional.
A. Mathies.
Economic analysis of the roles played 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 346 Economics of Social Security (Also ECON 441)]
This course provides students with an economic perspective on social security policies. The readings illustrate the use of economic analysis to predict the behavioral effects and income distributional consequences of policy. The course primarily focuses on the Old-Age, Survivors, and Disability Insurance Program. But other programs such as the Supplemental Security Income and mandates, for example, the Americans with Disabilities Act, that affect the aged and those with disabilities are discussed.

[PAM 350 Contemporary Issues in Women's Health]
This course deals with the history of women in medicine and the historical and cultural treatment of women's health problems. Health care research and the exclusion of women from research trials and protocols are also addressed. Reproductive issues, alternative approaches to treatment, medical problems, ethical issues, cancers, factors that contribute to post-traumatic stress disorders, health promotion behaviors, political issues, and routine medical recommendations are also discussed in depth. Students may take the course for credit, which requires attending a discussion section every other week and observing seven facilities (i.e., birthing center, mammogram, and ultrasound center, wellness center, hospital labor and delivery unit, Lamaze class, women's self-defense class, etc.) that provide a variety of women's health care.

[PAM 371 Demography and Family Policy]
Fall. 3 credits. K. Joyner.
This course examines from a demographic perspective family policies that concern children and adults. Toward this end, it considers the relationships between family policies and demographic behavior. It also addresses the effects of family policies and demographic behavior on the well-being of children. Although this course focuses on the United States, it considers U.S. trends against the backdrop of changes in other industrialized countries.

[PAM 380 Human Sexuality]
Spring. 4 credits. Limited to 200 students. Prerequisite: an introductory course in human development and family studies, psychology, or sociology (or equivalent social science course). Recommended one course in biology. A. Parrot.
The aim of this course is to provide students with an understanding of the interactions and interrelationships of human behavior that influence sexual development and behavior. The course focuses on the evolution of sexual norms, cross-cultural customs, legislation within changing sociopolitical systems, and delivery of sexual issues, needs, and/or problems. Future trends in sexuality are addressed. Students will attend two 75-minute lectures and one discussion section per week.

[PAM 383 Social Welfare as a Social Institution]
Fall. 3–4 credits. S-U grades optional. J. Allen.
Provides a philosophical and historical introduction to social welfare policy, programs, and services. The course examines the social, political, and economic contexts within which social welfare policies have evolved in the United States. It analyzes the ideological, political, and social processes through which public policy is formed, the significance of social justice, social and economic disparities, and the translation of public policies into social welfare programs. The importance of a global perspective is emphasized in the context of present program design, public concerns, interrelationships, and in support of services.

[PAM 392 New York State Government Affairs: Capital Semester in Albany]
Spring. 15 credits. (Human Ecology students: 7 of the credits count toward the outside-the-major requirement. PAM majors: credits satisfy capstone requirement and 7 additional PAM credits.) Permission of instructor. Open to sophomores, juniors, and seniors with minimum 2.3 GPA.
Students participate in either the New York State Assembly or New York State Senate Intern Programs. Internships include research on legislation, support for legislator initiatives and hearings, work on constituent interest group issues, and other tasks. Students also participate in one “in-residence” course, and Cornell students also participate in a seminar conducted by W. Rosen. Students earn $3,500 stipend.

[PAM 400-401-402 Special Studies for Undergraduates]
Fall and spring. Credits to be arranged. S-U grades optional. 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 multipage 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 and the department chair and filed at course registration or within the change-of-registration period after registration with an add/drop slip in 145 MVR, College Registrar's Office. 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 400: Directed Readings] For study that predominantly involves library research and independent reading.

[PAM 401: Empirical Research] For study that predominantly involves data collection and analysis.

[PAM 402: supervised Fieldwork] For study that involves both research and laboratory 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 403 Teaching Apprenticeship] Prerequisite: students must have taken the course for (equivalent) credit in which they will be assisting and have demonstrated a high level of performance. For study that includes assisting faculty with instruction.

The story of the 1990s was the story of information technology (IT) in business.
This is an upper-level MIS class on the management of technology with a particular emphasis on the public or nonprofit sector. Students will study the philosophy of computer science including ethics, security, and public policy. Students also will become proficient users of Access database software. As an imminent college graduate, each student will be expected to be comfortable with IT, to be knowledgeable about IT, and to be able to discuss IT intelligently. The main purpose of this course is to provide students with the tools they will need to be successful in a rapidly changing world.

**PAM 423 Risk Management and Policy**
The objective of this course is to provide students with a broad understanding of risk management problems and solutions, a greater appreciation of the importance of risk and risk regulation in our society, and increased comprehension of the complexities of making decisions about risk. Topics covered include alternative ways to define and measure risk, the importance and 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 are also considered.

**PAM 427 Complementary Alternative Medicine**
Fall. 3 credits. Prerequisites: a health course and intro biology or permission of instructor. Not offered 2004–2005. A. Parrot.

**PAM 435 The U.S. Health Care System**
Fall. 3 credits. R. Battistella.
This course provides an introduction to the health care delivery systems in the United States, and covers the inter-relatedness of health services, the financing of health care, and the key stakeholders in health care delivery including regulators, providers, health plans, employers, and consumers. The course describes the history and organization of health care, behavioral models of utilization, issues of health care reform, and current trends. The course provides an overview of the key elements of the field including ambulatory care services, mental health services, hospitals and clinicians, insurers, the role of public health organizations, and the politics of health care in the United States.

**PAM 437 Economics of Health Policy**
Spring. 3 credits. Prerequisite: ECON 101 or equivalent. S-U grades optional. 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. PAM 437 uses the U.S. states as its main institutional framework, but also pays attention to health care topics of international concern, such as the AIDS epidemic.

**PAM 440 Critical Perspectives**
Fall. 3 credits. J. Allen.
Presents an overview of different perspectives on U.S. social policies and programs with an emphasis on health, education, welfare, family, and consumer issues. Historical, social, scientific, and personal perspectives are analyzed and contrasted. Students will explore the inevitability and legitimacy of diverse perspectives on social conditions, policies, and programs. Students also will gain knowledge about the social contexts, conditions, policies, and programs mentioned in this course; critically analyze them; employ the conceptual frameworks presented in class; and evaluate policy debates by applying these insights.

**PAM 444 Violence against Women: Policy Implications and Global Perspectives (also FGSS 448)**
Fall (alternate semesters). 3 credits. A. Parrot.
Violence is committed against women worldwide at an alarming rate. This course focuses on the historical and current reasons for and impact of violence against women both domestically and internationally.

**PAM 457 Innovation and Entrepreneurship in the Health Care Industry**
Spring. 3 credits. Prerequisite: PAM 435 or permission of the 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 461 Public Policy and Marketing**
Fall. 3 credits. Prerequisites: PAM 200 and PAM 305. A. Mathios.

**PAM 473 Social Policy**
Spring. 3 credits. Prerequisites: GOVT 111 or SOC (ID SOC) 105 or permission of the instructor, S-U grades optional. Not offered 2004–2005. J. Allen.
An examination of the policy process and the significance of national policies as they affect the distribution of resources and services. Several analytical frameworks are used to evaluate social programs and service delivery systems in selected policy areas, including education, economic security, juvenile justice, child welfare, health, mental health, and housing. Implications for change and the significance of current competing policy priorities at the state and local levels will be explored. Field experiences in the Ithaca community are encouraged.

**PAM 499 Honors Program**
Fall or spring.
The honors program provides students with the opportunity to undertake basic or applied research which will be preparation of a thesis representing original work of publishable quality. The program is 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. PAM majors doing an honors program typically take PAM 499 for 3 credits a seminar for 3 semesters. See Professor Alan Mathios for more details.

**PAM 547 Microeconomics for Management and Policy**
This course introduces microeconomic theory and its application to decision making in the management and policy arenas. Special emphasis is placed on the economic environment of health care organizations and the problems faced by managers in this environment.

**PAM 552 Health Care Services: Consumer and Ethical Perspectives**
Fall. 3–4 credits. Limited to 30 students; undergraduates with permission of instructor. 4-credit option, may be used as Biology and Society Senior Seminar option. A. Parrot.
The course focuses on consumer and ethical issues faced by professionals in the health care field today. Broad topics to be 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, the patient, provider, and the legal aspects of health care, crisis intervention, 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 554 Legal Aspects of Health Care**
This course introduces principles of the law that are specifically applicable to health service delivery. Topics considered include: the liability of hospitals and their staff and personnel for injuries to patients; medical records and disclosure of information; consent to medical and surgical procedures; responsibility for patients' personal property; collection of bills; medical staff privileges; and confidential communications.

**PAM 556 Managed Care**
Fall. 3 credits. Prerequisite: PAM 557 or permission of instructor. Not offered 2004–2005. J. Kuder.

**PAM 557 Health Care Organization**
Fall. 3 credits. Limited to 30 students. Priority given to Sloan students or permission of the instructor. R. Battistella.
The course provides an introduction at the graduate level to the organization of
The course describes how health services are structured in the United States and how these different services interrelate along the continuum of care. The course describes and analyzes organization, delivery, and financing issues from a variety of perspectives using specific performance criteria (e.g., equity, quality, efficiency). Innovations by the public and private sectors in the delivery and reimbursement of health care are also presented.

PAM 558 Field Studies in Health Administration and Planning
Fall or spring. Fall, 1 credit; spring, 3 credits; 4 total credits. Staff.
Students interested in developing administrative and program-planning research skills are given an opportunity to evaluate an ongoing phase of health care agency activity in the light of sound administrative practice and principles of good medical care. In planning and carrying out the research, students work closely with a skilled practicing administrator with members of the faculty. This course is the capstone course for second-year Sloan students.

PAM 559 Epidemiology, Clinical Medicine, and Management Interface Issues
Spring. 3 credits. E. Rodriguez.
From an empirical and analytical framework this course explores the relationships between epidemiology, clinical medicine, and management. The course reviews the epidemiology, policy issues, and treatment of selected diseases accounting for a significant percentage of utilization and cost of health care services. In addition, students have an opportunity to explore issues of resource allocation and continuous quality improvement. The format for the class is lecture, discussion, and case analysis.

PAM 560 Quality in Health Care Organizations
Fall. 3 credits. Not offered 2004–2005. Staff.

PAM 561 Economics of Health and Medical Care
Spring. 3 credits. J. Kuder.
The course is designed to give graduate students an intensive introduction to the issues and techniques in the financial management of health service organizations. Class lectures, readings, guest-speakers, problems, case studies, and research for term paper/projects will all be used to demonstrate important points, which will be reinforced by examples and applications. The course emphasizes the internal financial management knowledge and skill necessary for financial success in complex health organizations.

PAM 563 Health Care Financial Management II: Payment Systems and Decision-Making
Fall. 3 credits. Prerequisite: PAM 562 or other financial management course. S. Nicholson.
Designed to strengthen student’s abilities to use the tools of financial management in guiding strategic decisions made in the health services sector. The class does this by 1) expanding and deepening the students’ knowledge and skills in general financial management and financial risk management, 2) describing and examining the unique features of the health industry that make the problems, the problem solving process, and the solutions different (especially important is a complete understanding of the effects of alternative payment systems, 3) emphasizing the skills in decision-making under conditions of uncertainty, and 4) using the knowledge and skills to analyze real world situations, make and defend decisions, and understand the risks involved with each decision and their consequences and approaches to their management.

PAM 564 Information Resources Management in Health Organizations
Spring. 3 credits. Recommended: strong basic computer skills. S-U grades optional. L. O'Neill.
Students are expected to have basic computer skills upon entry into the course. This course is a graduate course in Health Services Administration. Students are exposed to the opportunities and challenges inherent in the use of health management information systems (HMISs) in clinical and nonclinical applications. The course focuses on the manager's role in the application of HMISs to solve problems and address concerns in today's health care industry. Students learn how an HMIS can enhance the ability to appraise multiliminary and nonclinical services of care.

PAM 565 Managing Health and Human Service Organizations I
This is the first segment of a six-credit sequence addressing the management and leadership of health and human services organizations. Different perspectives are examined from that of the first line supervision to the CEO level. This course begins with a study of the basics of management—communications, motivation, change management, leadership, human resources, organizational design issues, and labor relations. It then looks at the development of technical skills in the areas of problem solving, decision making, productivity measurement, resource allocation and performance. The course is taught with an applied focus and utilizes a case study approach.

PAM 566 Strategic Management and Organizational Design of Health Care Systems
3 credits. Prerequisite: PAM 565. Staff.
This is the second segment of a six-credit sequence in the management and leadership of health and human services organizations. This course examines the mission of the organization, marketing, organizational culture issues, development of mission, the management of professionals, and studies the importance of roles, structure, and inter- and intra-institutional relationships within these organizations. The course is taught via a case study approach.

PAM 567 Health Policy
Fall. 3 credits. Sloan MHA students, Ph.D. students, or permission of instructor. K. Simon.
This course addresses major health policy issues and the critical processes that influence them. It focuses primarily on the United States, with some coverage of health policy in other countries. Topics discussed 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 legislation and execution 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 569 Regression Analysis and Managerial Forecasting
Fall. 3 credits. Prerequisite: at least one statistics course. L. Tobias.
This course 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. Applications to health care organizations are emphasized.

PAM 570 Health Care Accounting
Fall. 4 credits. N. Roufaiel.
This is a core course for students in Sloan Graduate Program, Master in Health Care Administration. The course introduces the basic concepts of financial and managerial accounting with emphasis on health care applications. The course 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, research, presentation, speakers, problem solving, videotapes, and lectures are used as teaching pedagogy.

PAM 571 Organizational Development/Human Resource Management in Health Care Organization
Fall. 3 credits. N. Fabrizio.
Students explore the theoretical foundation of organizational theory, training, and human resource management with an emphasis on implementation. Students explore real-world problems while analyzing, exploring, and discussing varied interpretations of selected cases. We cover the building blocks of managerial activity, internal organizational issues; performance issues related to organization design; and strategic issues.
Key organizational change and development concepts enhance students' perspectives on how the theories, strategies, and practices relate to the real world. The course serves as a framework to establish the theory and both the conceptual and competency foundations necessary for applying interventions.

PAM 572 Economic Evaluations in Health Care
Fall. 3 credits. S-U grades optional. D. Kenkel.
This course covers economic evaluation methods used for decisions in the health care sector and health policy. Economic evaluations include: cost analysis, cost-benefit analysis, cost-effectiveness analysis, and cost-utility analysis. The course discusses how to measure opportunity costs, monetary benefits, and health outcomes such as quality-adjusted life years. Actual economic evaluation applications in pharmaceuticals, health care and public health interventions, and health and safety policy are reviewed and critiqued. The course uses basic microeconomic and statistical tools. It is desirable but not required that students have some background in these areas.

PAM 579 Financial Fraud, Abuse, and Compliance in the Health Care Sector
Spring. 3 credits. N. Roufaiel.
A hands-on course on financial fraud with a special application to the health care industry. Cases in occupational fraud and abuse are identified and analyzed in their relation to rules and regulations in the health care field. The course covers a general introduction of fraudulent financial transactions and their investigation, prevention, and detection and managing health care compliance. Emphasis is placed on fraud-prevention techniques, evaluating fraud complaints, fraud resolution, understanding legal and financial aspects of fraud, and the impact of fraud on organizational effectiveness, disciplinary mechanisms, and ethical standards. Collaborative learning, case analysis, group discussion, readings, class presentation, and research are basic teaching methodologies. To enhance students' understanding of the health care fraud, students are required to access and use materials and resources available on the World Wide Web, watch videotapes, and examine professional journals for related topics.

PAM 600 Special Problems for Graduate Students
Fall and Spring. Credits to be arranged. S-U grades optional. Staff.
Independent advanced work by graduate students recommended by their chair and approved by the department chair and the instructor.

PAM 601 Policy Process and Theory
Fall. 3 credits. R. Swisher.
This course introduces students to the policy process model, of goal setting and problem formulation, identification of policy alternatives, cost-benefit analysis and policy selection, implementation, monitoring, and feedback. At each stage, we read and discuss theoretical contributions from across the social sciences and political philosophy, that help to contextualize and "socially embed" this mainstream, micro-economics driven model. Such contributions include: notions of bounded-rationality, satisficing, incrementalism, and muddling-through from organizational behavior, heuristics and biases from social psychology; theories of justice from political philosophy, habitus and other pragmatic logics from anthropology, and concepts such as program, power, status, symbolic interaction, and social learning from sociology and psychology.

PAM 603 Experimental, Quasi-Experimental, and Economic Evaluation Methods
Spring. 3 credits. Strongly recommended background in behavioral economics (e.g., PAM 605, ECON 639) or equivalent and micro-economics (e.g., PAM 200. PAM 547 or ECON 639). 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, family, 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 of the course 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 604 Qualitative, Survey, and Mixed Method Approaches to Policy Research
Fall. 3 credits. M. Walker.
Explores qualitative methods of field research, including surveys, in-depth interviews, participant observation, and focus group interviews. The course introduces students to qualitative methods and addresses strategies for triangulating different methods of data collection. Topics of nonprobability sampling, questionnaire design, scale measurement, and reliability will also be covered.

PAM 605 Economics of Family Policy
Fall. 3 credits. Prerequisite: PAM 639 or ECON 639 or consent of instructor. S-U grades optional. Not offered 2004–2005. E. Peters.
This course examines household decision making in both single agent and multiple agent (e.g., game theoretic or bargaining) frameworks. The first half of the course focuses on: 1) fertility; 2) household production; 3) and time allocation models of behavior—decisions that are usually modeled in a single-agent framework. The second half of the course looks at: 1) marriage markets; 2) family formation and dissolution; 3) bargaining models of resource allocation within the household; and 4) and intergenerational transfers across households. These kinds of behaviors are more fruitfully studied using multidimensional agent models such as contract theory, game theory, and household bargaining. Empirical applications of the theoretical models are presented for both developed and developing countries. Implications of these policies such as child care subsidies, divorce laws, family planning, government subsidies to education, and social security are also discussed. Much of the material covered by this course could also be found in economic demography and economics of the family courses.]

PAM 606 Demographic Techniques (also D SOC 608)
Fall. 3 credits. S-U grades optional. D. Gurak, K. Joyner.
See D SOC 608 for course description.

PAM 608 Economics of Consumer Demand (also AEM 670)
Fall. 3 credits. Prerequisite: PAM 200, ECON 313, or concurrent enrollment in one of those, and 2 semesters of calculus. S-U grades optional. C. Ranney.
See AEM 670 for course description.

PAM 611 Social Demography
Spring. 3 credits. Limited to seniors and graduate students. J. Ziegler.
Explores current issues of ethics and public policy against a backdrop of theories of ethical behavior. Questions of how officials and managers of public and nonprofit agencies and private enterprises act will be examined. How do standards of ethical behavior in the professions get established? How are public policy issues with ethical implications resolved? Readings will be drawn from political philosophy, contemporary social science, and imaginative writing. Class participation is essential.

PAM 632 The Intergovernmental System: Analysis of Current Policy Issues
This weekly seminar 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 the pharmaceutical industry. Specific topics vary and depend in part on the interests of the invited speakers. Students are required to write critiques of invited papers and to submit a literature review on a selected topic in pharmaceutical policy.

PAM 633 Seminar in Pharmaceutical Policy Issues
This course offers advanced policy analysis of current political/social/economic issues in the context of the intergovernmental system. Particular attention is paid to how certain policy and public service issues are played out at the federal, state, and local levels of government, and to the formulation of federal and state budget policy. General public administration theory is considered. Students work in teams on a policy/administrative research project and report to the class.

PAM 639 Graduate Microeconomics for Policy Analysis
Fall. 4 credits. Prerequisites: Intermediate Economics, Calculus. Priority given to Ph.D. students. Undergraduates welcome with permission of the instructor. J. Cawley.
The goal of this course is to train graduate students in the use of the tools of microeconomics in order to prepare them to conduct high quality research in the social sciences. This comprehensive course covers microeconomic theory and its application to public policy analysis. Topics addressed include consumer decision-making, the theory of the firm, general equilibrium, welfare economics, monopolies and oligopolies, strategy, and market imperfections.

PAM 648 Consumers, Information, and Regulatory Policy
Fall 3 credits. Prerequisites: PAM 639 or calculus and intermediate microeconomics. Not offered 2004-2005. A. Mathias. Examines information problems in markets and business. Topics include microeconomic theory focused on market mechanisms and regulatory actions that address those information problems. Major theoretical topics covered include price and quantity uncertainty, moral hazard, adverse selection, and 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 journals, policy journals, and papers from the Journal of Public Policy and Marketing.

PAM 691 Health Economics I (also ECON 691)
Spring. 3 credits. Prerequisites: Ph.D. level courses in microeconomic theory and econometrics. J. Cawley. This comprehensive course covers microeconomic theory and its application to health and health care markets. Topics addressed 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. This is the first course in the Ph.D.-level health economics sequence.

PAM 760 Challenges and Trends in the Health Services Industry
Fall and spring. 1 credit. S-U grades only. Staff. The goal of the course is to provide students with information and exposure to current and emerging issues in the health services industry. Topics may include such matters as: 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 799 MPS Problem Solving Project
Fall or spring. Credits to be arranged. For students recommended by their chair and approved by the instructor in charge of independent advanced work. S-U grades recommended.

PAM 899 Master's Thesis and Research
Fall and spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional.

PAM 999 Doctoral Thesis and Research
Fall and spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional.

TEXTILES AND APPAREL

PAM 114 Introduction to Computer-Aided Design
Fall, summer 6-week session. 3 credits. Limited to 14 students per section. Priority is given to TXA students. S-U grades optional. A. Racine. A studio course that explores the creative potential of microcomputers. The AutoCAD software program is used as a design tool for generating a wide variety of visual images. Basic Photoshop software commands are introduced. Daily hands-on demonstrations and studio work. Students develop two-dimensional designs based on historical, cultural, and museum sources for portfolios and display.

PAM 117 Fashion Graphics (Drawing the Clothed Figure)
Spring. 3 credits. Enrollment limited to 21 students. Priority is given to apparel design students. Prerequisite: basic drawing course. Letter grades only. Minimum cost of supplies $80. A. Racine. A studio course that explores the creative potential of microcomputers. The AutoCAD software program is used as a design tool for generating a wide variety of visual images. Basic Photoshop software commands are introduced. Daily hands-on demonstrations and studio work. Students develop two-dimensional designs based on historical, cultural, and museum sources for portfolios and display.

PAM 125 Art, Design, and Visual Thinking
Fall. 3 credits. S-U grades optional. C. Jirousek. An introduction to the visual arts and design that explores aesthetic and cross-cultural dimensions of visual experience. Augusted 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. Social, cultural, and historic interpretations of visual expression are discussed.

PAM 135 Fibers, Fabrics, and Finishes

PAM 138 Fiber and Yarn Analysis Laboratory
Spring. 1 credit. Students are required to take TXA 135 and TXA 136 concurrently. Letter grades only. M. Frey. Course consists of 14 laboratory sessions, in which students learn techniques to identify and test fibers and yarns. A midterm and final exam will be based on using the methods learned to identify a given yarn (midterm) and an unknown bi-component yarn (final).

PAM 145 Introduction to Apparel Design
Spring. 4 credits. Limited to 30 students with 18 students per lab section. Priority is given to TXA students, and students transferring into TXA. Prerequisite: TXA 114. Letter grades only. Apparel design majors should take course during the first year. Minimum cost of materials. $150. A. Racine. Intensive study of principles and processes of flat-pattern design with emphasis on creative expression in children's apparel. Students develop an understanding of the techniques needed to produce apparel from sketches, including patterning and garment assembly.

PAM 237 Structural Fabric Design
Fall. 3 credits. Prerequisite: TXA 135. Recommended: college algebra. S-U grades optional. M. Frey. A studio course that explores the creative potential of microcomputers. The AutoCAD software program is used as a design tool for generating a wide variety of visual images. Basic Photoshop software commands are introduced. Daily hands-on demonstrations and studio work. Students develop two-dimensional designs based on historical, cultural, and museum sources for portfolios and display.

PAM 259 Art, Design, and Visual Thinking
Fall. 3 credits. S-U grades optional. C. Jirousek. An introduction to the visual arts and design that explores aesthetic and cross-cultural dimensions of visual experience. Augusted 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. Social, cultural, and historic interpretations of visual expression are discussed.

PAM 265 Apparel Pattermaking
Spring. 3 credits. Limited to 30 students. Prerequisites: TXA 114, 117, 125, 145, 264; and TXA 135 (may be taken concurrently). Letter grades only. Minimum cost of materials. $125. Lab fee: $10. S. Ashdown. The goal of this apparel studio course is to expand student competencies in flat pattern design and analysis and fitting techniques. Students generate original design concepts using fashion sources from historic to contemporary times. The Cornell Costume Collection is used for inspiration and instruction. Full-scale samples in various levels of completion, for example patterns to muslin to finished garments, include detailed technical drawings for portfolios.
TXA 266 Apparel Design: Product Development  
Spring. 3 credits. Prerequisites: TXA 114, 145, 264, and TXA 117 and 265 (may be taken concurrently). Letter grades only. Minimum cost of materials, $250; lab fee, $10. S. Ashdown.  
A project-based course in which students explore the relationship between technology and design. Students learn computer-aided patternmaking, grading, manufacturing technologies, communication of technical details, flats, specifications, and costing of garments. Determining factors affect design. Designs are developed to various stages from conceptual work to final garment.

TXA 300 Special Studies for Undergraduates  
Fall or spring. Credit to be arranged. Staff. 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 a form available from the College Registrar's Office. The form, signed by both the instructor instructing the study and the department chair, is filed at course registration or during the change-of-registration period.

TXA 325 Color and Surface Design of Textiles (formerly TXA 225)  
Fall. 4 credits. Limited to 18 students. Preference given to TXA apparel design majors. Recommended: TXA 114 and TXA 135. Minimum cost of materials, $120; 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.

TXA 332 Designers as Entrepreneurs  
Spring. 1 credit. Enrollment limited to 40 students. Preference: any design course. S-U grade optional. S. Loker.  
This course presents issues that are critical to designers who are entrepreneurs, such as product development and maintenance, sourcing materials, intellectual property, services; copyright, trademark, and patents; branding and licensing; mass customization; distribution options including e-commerce; and social responsibility in business. The course draws extensively on guest speakers and case studies.

TXA 335 Fiber Science  
Fall. 3 credits. Limited to 20 students. Prerequisites: college chemistry and physics. S-U grade optional. A. Natarali.  
This course covers fibers commonly used in various engineering, medical, and apparel applications. Topics include the nature of polymer molecules, the chemical structure of organic fibers, inorganic fibers, micro-macro structure of fibers, fiber dimensions, environmental effects, and mechanical, optical, thermal, and electrical properties of fibers. The following fiber uses are discussed: composites in aerospace and other structural components, circuit boards, bulletproof vests, sutures, artificial arteries, geotextiles, sporting goods, and others.

TXA 336 Fundamentals of Color and Dyeing  
Fall. 4-5 credits. Prerequisites for lecture only: 4 credits for lecture and lab. Fiber science students are required to take the lab. Prerequisite: college Natural Science Requirements. S-U grades optional. Lab fee, $15. Not offered 2004-2005. C. C. Chu.  
Color is extremely important and useful in daily life. This course emphasizes theories and scientific principles of color, providing a framework for the use of color in design, marketing, or research. How colorants are used in design will also be discussed. Although fabrics are chiefly used to illustrate color in the class, much of the information and knowledge is useful to nontextile majors. Guest lecturers from the industry address the practical aspects of color in business.

TXA 346 Design Process  
Fall. 4 credits. Enrollment limited to 30. Prerequisite: TXA 135, TXA 145, TXA 264, and TXA 265. Letter grades only. Minimum cost of materials, $140; lab fee, $10. V. D. Lewis.  
Provides an exposition of the methods used by fashion designers and their assistants. The course aims to develop your personal handwriting as a designer. It unites a provocative design issue with the requirement of functionality and emphasizes pattern cutting as a way of realizing design ideas.

TXA 369 Style, Fashion, and the Apparel Industry (formerly TXA 269)  
Fall. 2 credits. Limited to 30 students. Preference to TXA majors. Not open to freshmen. Prerequisites: TXA 125, TXA 135, and TXA 257. Letter grades only. A. Racine.  
Illustrated lectures focus on changes in the U.S. apparel industry and fashion from the nineteenth century to the present day due to social forces, technological developments, and shifting demographics. The Cornell Costume Collection is used for discussion. Students write term paper on issues relating to the fashion industry.

TXA 370 Principles of Color and Design in Textiles  
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 designer resource. Students complete hands-on exercises, two exams, and a paper.

TXA 400-401-402-403 Special Independent Studies for Undergraduates  
Fall, summer, or spring. Credits to be arranged. S-U grades optional. Staff.  
For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of TXA not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multiplicity description of the study they wish to undertake. S-U only. This 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 145 MVR, College Registrar Office. 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.

TXA 400: Directed Readings. For study that predominantly involves library research and independent reading.

TXA 401: Empirical Research. For study that predominantly involves data collection and analysis, or laboratory or studio projects.

TXA 402: Supervised Fieldwork. S-U 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.

TXA 403: Teaching Apprenticeships. Fall or spring. 2-4 credits. Prerequisites: student must have upperclass standing, have demonstrated a high level of performance in the subject to be taught and in the overall academic program, and have permission of the instructor and the department chair. S-U grades optional. Staff. Apprenticeship includes both a study of teaching methods in the field and assisting the faculty with instruction.

TXA 431 (331) Apparel Production and Management  
Spring. 3 credits. Enrollment limited to 40 students. Prerequisites: ECON 101 and 102 and an upper-division course in either apparel or textiles. S-U grade optional. S. Loker.  
This course presents an introduction to the global textile and apparel industry, particularly the technical and economic aspects of apparel production. It includes analysis of specific apparel manufacturing and management issues such as international sourcing, Quick Response, mass customization, production and information technology, labor, and logistics.

TXA 432 Product Quality Assessment  
Spring. 3 credits. Enrollment limited to 36 in lecture and 18 in each lab section. Prerequisites: TXA 135 and Statistics. S-U grades optional. Lab fee, $15. N. Breen.  
This course covers evaluation of fibers, yarns, fabrics, and garments, with emphasis on the meaning of standards, testing philosophy, quality control, and statistical analysis. Day-to-day tests done in textile and apparel industry are discussed. Laboratory sections introduce students to various test methods, data generation for analysis, and evaluation.

TXA 436 Fiber Chemistry  
The chemical and physical structure of several commercially important fibers, such as cotton, wool, silk, polyesters, nylons, acrylics, polylefinns and spandex, and their polymerization process are discussed. The general chemical and physical properties of each are given. Degradation reactions for certain fibers such as polylefinns and acrylics are discussed.
TXA 439 Biomedical Materials and Devices for Human Body Repair (also BMEP 539)
Spring, 2-3 credits. 2 credits meet T only. 3 credits meet T and R. Juniors and seniors only. Prerequisite: college Natural Science requirement (Chem. or Biol.). S-U grades only for 2 credits, letter grades only for 3 credits. C. C. Chu. Survey of materials and devices for repair of injured, diseased, or aged human tissues/organs. It includes properties of synthetic and biological materials, wound healing processes, medical devices for repair of wounds, blood vessels, hearing, bones, nerves, male impotence, vision/hearing/voice, and drug control/release.

TXA 444 Apparel/Textile Retailing and Distribution
Fall. 3 credits. Juniors and seniors only. Prerequisite: TXA 135 and a marketing course. S-U grades optional. N. Breen. This course provides an overview of the business of design, production, distribution, marketing, and merchandising of apparel and related products from a management perspective. The organization and structure of both domestic and international retailers is included along with pricing strategies, merchandise planning, inventory management, and sales promotion. New uses of computer systems and information technologies are emphasized throughout.

TXA 466 Textiles, Apparel, and Innovation
Fall. 3 credits. Prerequisite: TXA 237. Recommended: TXA 432. S-U grades optional. Field trip fee, $100. Offered alternate years. S. Ashdown. Designed for students in all TXA options, the course 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.

TXA 470 Fashion Presentation: Portfolio Development
Fall or spring. 3 credits. Enrollment limited to 25. Prerequisites: TXA 117, TXA 264, TXA 265, and TXA 346. Minimum cost of materials, $100. V. D. Lewis. Students will 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.

TXA 499 Honors Thesis Research
Fall and spring. 1-6 credits (maximum 6 credits for graduation). Prerequisite: TXA students who have been admitted to college honors program. S-U grades optional. Staff. Independent research leading to the honors thesis. College honors program guidelines are to be followed.

TXA 600 Special Problems for Graduate Students
Fall or spring. Credit to be arranged. S-U grades optional. Staff. Independent research. Work by graduate students recommended by their chair and approved by the department chair and approved by the department chair and approved by the department chair and approved by the department chair and approved by the department chair and approved by the department chair and approved by the department chair.

TXA 620 Physical Properties of Fiber-Forming Polymers and Fibers
Spring. 3 credits. Permission of instructor. Offered alternate years. A. N. Netravali. Formulation and properties of fiber-forming polymers, rubbery, glassy, and crystalline states and their interconnection. Fiber structure, relationship between chemical structure and physical properties of manufactured and natural fibers, mechanical, thermal, and viscoelastic properties of fibers and testing methods will be discussed.

TXA 626 The Chemistry of Textile Finishes and Dyeing
Spring. 3 credits. Prerequisites: TXA 336 or equivalent and organic chemistry, or permission of instructor. S-U grades optional. Offered alternate years. C. C. Chu. Chemical aspects of textiles with emphasis on finishes and dyeing are discussed. Industrially important textile chemicals used for dyeing and enhancing fiber and fabric properties, such as dura dry press, anti-soiling, water repellency are studied. The emphasis is on the correlation of the observed effect with chemical structure, end-use influences, interaction with fabric and fibers, sources, and synthetic routes. The environmental effect of these textile chemicals and current federal regulation is briefly discussed.

TXA 637 Research Seminars in Apparel Design
Fall and spring. 1 credit; S-U only; repeat permission of instructor. S-U grades optional. Offered alternate years. S. Ashdown. Designed for students in all TXA options, the course 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.

TXA 639 Mechanics of Fibrous Assemblies
Fall. 3 credits. Prerequisite: solid mechanics or permission of instructor. Offered alternate years. Not offered 2004-2005; next offered 2005-2006. S-U grades optional. Staff. A study of the mechanics of fiber assemblies: idealized yarn and fabric models; statistical bundle theories; deformation of yarns and fabrics in tensile, shear, and compressive stress; bending and buckling; and the mechanical behavior of nonwoven textile materials.

TXA 664 Human Factors: Anthropometrics and Apparel
Fall. 3 credits. Open to advanced undergraduates. Prerequisites: course in statistics and permission of instructor. S-U grades optional. Offered alternate years; next offered 2005-2006. 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 aspects of clothing; apparel sizing techniques; national and international sizing systems and standards; impact of sizing systems on various populations (elderly, handicapped, etc.).

TXA 666 Fiber Formation: Theory and Practice
Spring. 3 credits. Prerequisites: organic chemistry, college physics, TXA 436, TXA 620, or permission of the instructor. S-U grades optional. Offered alternate years; next offered 2005-2006. M. Frey. Covers the practical and theoretical analysis of the chemical and physical principles of the methods of converting bulk polymer to fiber; rheology, melt, dry, and wet polymer spinning; fiber drawing; heat setting; and general theory applied to unit processes.

TXA 670 Fashion Theory
Spring. 3 credits. Enrollment limited to 25. Prerequisite: TXA 346 for undergraduates or permission of the instructor. S-U grades only. Offered alternate years; next offered 2005-2006. V. D. Lewis. Provides students with the theoretical tools that will enable them to conduct debates and create strategy about the design of fashion. Debates will support visual outcomes, conceptual foundations, and methodologies that are unequivocal in practice, criticism, education, management, and the cultural context of fashion design.

TXA 675 Aesthetics and Meaning in World Dress
Spring. 3 credits. S-U grades optional. Prerequisites: TXA 125 or course in history of art, costume history, or other history. S-U grades optional. Offered alternate years. C. Jirousek. An examination of the aesthetic and social/psychological relationship between body and clothing in the context of various cultures. Students develop a research topic to be presented orally and in a term paper, and they participate in the development of an exhibition.

TXA 899 Master's Thesis and Research
Fall or spring. Credits to be arranged. Permission of the chair of the graduate committee and the instructor. S-U grades optional. Staff.

TXA 999 Doctoral Thesis and Research
Fall or spring. Credits to be arranged. Permission of the chair of the graduate committee and the instructor. S-U grades optional. Staff.

FACULTY ROSTER
Ashdown, Susan, Ph.D., U. of Minnesota. Assoc. Prof., Textiles and Apparel
Avery, Rosemary J., Ph.D., Ohio State U. Prof., Policy Analysis and Management
Battistella, Roger M., Ph.D., U. of Michigan. Prof., Policy Analysis and Management
Becker, Franklin D., Ph.D., U. of California at Davis. Prof. and Chair, Design and Environmental Analysis
Brannon, Patsy, Ph.D., Cornell U. Prof., Nutritional Sciences, Dean
Brunberg, Joan J., Ph.D., U. of Virginia. Prof., Human Development
Burkhauser, Richard, Ph.D., U. of Chicago Prof. and Chair, Policy Analysis and Management
Cassola, Mariella, Ph.D., U. of Texas, Austin. Asst. Prof., Human Development
Cawley, John, Ph.D., U. of Chicago. Asst. 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., Textiles and Apparel

Cochrin, Moncrief, Ph.D., U. of Michigan. Prof., Human Development

Cornelius, Steven W., Ph.D., Pennsylvania State U. Assoc. Prof., Human Development

Danko, Sheila, M.I.D., Rhode Island School of Design. Assoc. Prof., Design and Environmental Analysis

Depue, Richard, Ph.D., U. of Oklahoma. Prof., Human Development

Dunifon, Rachael, Ph.D., Northwestern U. Asst. Prof., Policy Analysis and Management

Eckenrode, John J., Ph.D., Tufts U. Prof. and Chair, Human Development

Elliot, John, M.E. Des., U. of Calgary. Asst. Prof., Design and Environmental Analysis


Evans, Gary, Ph.D., U. of Massachusetts at Amherst. Prof., Design and Environmental Analysis

Frey, Margaret, Ph.D., North Carolina State U. Asst. Prof., Textiles and Apparel

Garbarino, James, Ph.D., Cornell U. Prof. and Co-Director, Family Life Development Center


Gerner, Jennifer L., Ph.D., U. of Wisconsin. Prof., Policy Analysis and Management, Assoc. Dean

Gibson, Kathleen J., M.A., Ohio State U. Assoc. Prof., Design and Environmental Analysis

Greene, Katrina, Ph.D., U of Virginia. Asst. Prof., Human Development

Hamilton, Stephen F., Ed.D., Harvard U. Prof., Human Development, Co-Director, Family Life Development Center

Haugaard, Jeffrey, Ph.D., U. of Virginia. Assoc. Prof., Human Development

Hazzin, Cindy, Ph.D., U. of Denver. Assoc. Prof., Human Development

Hedge, Alan, Ph.D., U. of Sheffield (England). Prof., Design and Environmental Analysis

Jennings, Jan, M.S., Oklahoma State U. Assoc. Prof., Design and Environmental Analysis

Jirousek, Charlotte, Ph.D., U. of Minnesota. Assoc. Prof., Textiles and Apparel


Kenkel, Donald, Ph.D., U. of Chicago. Prof., Policy Analysis and Management

Koslowski, Barbara, Ed.D., Harvard U. Assoc. Prof., Human Development


Lacquar, Joseph Jr., Ph.D., Cornell U. Assoc. Prof., Design and Environmental Analysis

Lemley, Ann T., Ph.D., Cornell U. Prof. and Chair, Textiles and Apparel

Lewis, Van Dyk, Ph.D., University of Central England, Birmingham. Asst. Prof., Textiles and Apparel

Loker, Suzanne, Ph.D., Kansas State U. Prof., Textiles and Apparel

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

Maxwell, Lorraine E., Ph.D., City U. of New York. Assoc. Prof., Design and Environmental Analysis

Moen, Phyllis, Ph.D., U. of Minnesota. Prof. and Director, Bronfenbrenner Life Course Center

Netravali, Anil, Ph.D., North Carolina State U. Prof., Textiles and Apparel

O'Neill, Liam, Ph.D., Pennsylvania State U. Asst. Prof., Policy Analysis and Management

Obendorf, Sharon K., Ph.D., Cornell U. Prof., Textiles and Apparel, Assoc. Dean

Parrot, Andrea, Ph.D., Cornell U. Prof., Policy Analysis and Management


Pillmer, Karl A., Ph.D., Brandeis U. Prof., Human Development

Pollak, Patricia B., Ph.D., Syracuse U. Assoc. Prof., Policy Analysis and Management

Robertson, Steven S., Ph.D., Cornell U. Prof., Human Development


Savin-Williams, Ritch C., Ph.D., U. of Chicago. Prof., Human Development

Simon, Kosall, 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

Swisher, Raymond, Ph.D., U. of North Carolina, Chapel Hill. Asst. Prof., Policy Analysis and Management

Temple, Elise, Ph.D., Stanford U. Asst. Prof., Human Development

Tennyson, Sharon, Ph.D., Northwestern U. Assoc. Prof., Policy Analysis and Management

Toibis, Donald J., Ph.D., Michigan State U. Assoc. Prof., Policy Analysis and Management

Trochim, William M. K., Ph.D., Northwestern U. Prof., Policy Analysis and Management

Waller, Maureen R., Ph.D., Princeton U. Asst. Prof., Policy Analysis and Management

Wang, Q. I., Ph.D., Harvard University. Asst. Prof., Human Development

Wells, Nancy, Ph.D., U. of Michigan. Asst. Prof., Design and Environmental Analysis

Whittington, 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

Basinger, Annette, B.A., Michigan State. Lecturer, Design and Environmental Analysis

Beck, Sam N., Ph.D., U. of Massachusetts. Sr. Lecturer, Urban Semester

Breen, Nancy, Ph.D., Syracuse U. Lecturer, Textiles and Apparel

Delara, Thomas, M.B.A., Barry U. Lecturer, Policy Analysis and Management

Gilmore, Rhonda, M.A., Cornell U. Lecturer, Design and Environmental Analysis

Meneeley, Jason, M.S. U. of Kentucky. Lecturer, Design and Environmental Analysis

Pilli, Ariel, Annette B., Cornell U. Sr. Lecturer, Textiles and Apparel


Segal, Harry, Ph.D., U. of Michigan. Sr. Lecturer, Human Development
SCHOOL OF INDUSTRIAL AND LABOR RELATIONS

ADMINISTRATION
Edward J. Lawler, dean
Robert Smith, associate dean, academic affairs
Gordon Law, librarian
Allan Lentini, director, administrative services
Martin Wells, director, research
Christopher Haley, director, external relations
Laura Lewis, director, office of student services
John Bunge, graduate faculty representative
Tove Hammer, editor, Industrial and Labor Relations Review

DEGREE PROGRAMS

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THE SCHOOL
The School of Industrial and Labor Relations at Cornell (ILR) is a small school within a large university. It tries to maintain the small-college atmosphere expected of an institution that has about 750 undergraduates and approximately 180 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.

Almost half of the school's typical freshman class comes from the greater New York City area. Another 30 percent live in other parts of New York State. Students from other states and a few from foreign countries make up the rest of the class. Women constitute about 50 percent of entering classes, and minority students comprise about 25 percent of freshmen and transfer students.

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 public service, 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 Public Service Division.

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, 216 Ives Hall, Ithaca, NY 14853–5901.

DEPARTMENTS OF INSTRUCTION
Courses in the school are organized into six departments:

**Collective Bargaining, Labor Law, and Labor History**
In the study of workers, employers, and the government policies affecting them, members of this faculty concentrate on subjects of industrial and labor relations best understood by reliance on the fields of administration, economics, history, and law. Courses explore subjects within the framework of American society, stress fundamental forces of change, and analyze texts and empirical data with methods drawn from the social sciences, the humanities, and the legal professions.

**Human Resource Studies**
This department offers specialization in human resource studies. Human Resources focuses on employer-employee relationships and deals with such topics as human-resource planning, staffing, computer applications to personnel, personnel information systems, training, management development, performance appraisal, compensation administration, organization development, and the sociological environment of human resource management. The study of human resource policy focuses on government efforts to enhance the population's ability to be employed. Although primarily concerned with governmental measures that influence the supply of labor (for example, training, education, health, mobility, and immigration), the subject area also includes policies in private industry that relate to the demands for labor.

**International and Comparative Labor**
International and Comparative Labor Relations is concerned with international and labor relations systems and labor markets in other parts of the world. Countries include those in Asia, Latin America, and South America.

**Labor Economics**
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 the following: 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**
By studying individuals, groups, single organizations, and associations or organizations, persons in the field of organizational behavior understand human behavior within organizations as well as the actions of the organizations themselves. At the individual level of analysis, courses consider motivation, leadership, attitudes, personality, group processes, organizational change, and worker participation. At the organizational level, courses examine occupations, deviance in the workplace, conflict, power, organizational design, public policy regarding organizations, and industrial conflict. The department also offers courses on research methods in organizational research and general survey courses in both psychological and sociological research.

**Social Statistics**
Economic and social statistics includes 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 and student committees to administer degree programs for the school and many of the school’s support services. The office’s responsibilities include the admitting and orienting of new students, maintaining students’ personal and academic records, and counseling students on personal and academic problems. 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 advisers for students who wish to consult with them regarding career possibilities in the field, postgraduate programs, or similar matters. Questions or issues related to graduation requirements, course registration, and related academic procedures should be raised with counselors in the Office of Student Services.

Minority Programs
Cornell University administers a variety of special opportunity programs designed to provide financial and other forms of assistance to 1) minority students and 2) low-income students meeting program guidelines. The purpose of these programs is to provide access to a Cornell education for capable students who otherwise might not secure the admissions consideration, financial assistance, or supportive services necessary for their success at the university. The associate director for minority education in the Office of Student Services provides academic and personal counseling to all ILR minority students. ILR offers a variety of support services to enhance academic achievement. See the Minority Affairs web site at www.ilr.cornell.edu/studentservices/ac/minority.html.

STUDY OPTIONS
Several study options are open to ILR undergraduates, making it possible to tailor a program to fit special circumstances.

One such option is the five-year ILR master’s degree. With early planning, some students may earn the M.S. degree in the fifth year. Some students elect to spend a semester in New York City, Albany, or Washington, D.C., with a chance to observe actual labor problems as interns in congressional offices, labor organizations, personnel offices, and state and federal agencies. For more information, see “Special Academic Programs” below.

Study abroad options are also available at a number of foreign universities. Qualified students may spend a semester or a full year studying abroad.

A number of ILR courses deal directly with today’s problems and involve fieldwork in the Ithaca area and elsewhere in New York State. The ILR program allows juniors and seniors who want to conduct their own research to receive course credit for individually directed studies if the program is supervised by a faculty member.

Sophomore Year
Fall Semester
- Statistics I (ILRST 210) 3
- Development of Economic Institutions (ILRLE 140) 3
- Labor and Employment Law (ILRCB 201) 3
- Human Resource Management (ILRHR 260) Fall 3
- Elective 3

Spring Semester
- Statistics II (ILRST 211) 3
- Economics of Wages and Employment (ILRLE 240) 3
- Distribution: Cultural Perspectives 3
- Distribution: Western Intellectual Tradition 3
- Elective 3

Junior and Senior Years
- Economic Security (ILRLE 340) 3
- Collective Bargaining (ILRCB 300) 3
- Distribution: International and Comparative Labor ILRIC 3
- Distribution: Upper-Division Writing 3
- Distribution: Science and Technology 3
- ILR and General Electives

ILR Electives—30 credits (one course must be ILRIC)

Minimum of 12 credits of ILR course work including 495 (Honors), 499 (Independent Study) and approved list of courses from the LE Department.

Maximum of 12 credits from foreign languages, advanced math, or other non-ILR courses as approved by ILR departments.

Maximum of 9 credits for one semester abroad or 15 credits for a full year.

Maximum of 9 credits for internships (497: 3 credits; 498: 6 credits S-U).

General Electives—34 credit hours of which up to 22 hours may be freely elected in the university’s endowed divisions.

Required Courses
(49 credits)
The curriculum prescribes the courses and subjects listed in the table above; some are illustrative.

Elective Courses
(71 credits)
From the courses offered by the school, students must select a minimum of 30 credits of ILR elective courses. No more than 9 of these credits may be satisfied by ILR 497–498, internships, or one semester of study abroad.

Undergraduates are required to select one intensive writing course (for a minimum of 3 credits) from a list of designated courses.

The remaining 34 credits may be selected from the courses of any other college at Cornell, but a student who takes more than 34 credits in the endowed colleges (the...
The number of credits that may be taken in the endowed colleges at no additional cost to the student may be changed at any time by official action of the school.

ILR Math Requirement

A student who took AP calculus in high school and scored a 3 or better on the AB exam or subscore of BC exam has fulfilled the ILR math requirement. If AP calculus wasn't completed, or if the scores noted above were not achieved, you will be expected to take and pass the ILR Math Assessment before registering for required courses in Statistics and Labor Economics. The Math Assessment is based on materials covered in New York State Regents Exams for Courses 2 and 3. (Calculus is not covered in those courses.)

The ILR Math Assessment will be scheduled in August, January, and May. Those who do not pass in the first attempt will be 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 requirements by the beginning of the third semester will be enrolled for a terminal term and will be expected to leave the school thereafter.

Transfer students will be 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 ILRST 210 or ILRLE 240 with a terminal semester possible after failing the assessment given at the beginning of a third semester as an ILR student.

SCHEDULING AND ATTENDANCE

Schedule Changes
Occasionally it may be necessary for a student to request changes in his or her course schedule either before a term 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. 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 1987 the faculty of the School of Industrial and Labor Relations approved a revised code of academic integrity. This code, while based on the Cornell University code, varies somewhat.

Absolute integrity is expected of all Cornell students in all academic undertakings. They must in no way misrepresent their work, fraudulently or unfairly advance their academic status, or be a party to another student's failure to maintain academic integrity. The code specifically prohibits:

1) knowingly representing the work of others as one's own;
2) using or obtaining unauthorized assistance in any academic work;
3) fabricating data in laboratory or field work;
4) giving fraudulent assistance to others;
5) fabricating data in support of laboratory or field work.

Full details on the applications of those prohibitions to course work, term papers, examinations, and other situations are listed in the code. Copies are available from the Office of Student Services, 101 Ives Hall.

Dean's List
A Dean's List is compiled for each of the four undergraduate classes each term on the seventh day 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 term 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 term of 12 letter-graded credits;
3) completion of all courses registered for at the beginning of the term;
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 term:

1) an average of C- (1.7) 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- (1.7) for all completed terms.

If at the end of any term 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 does not improve after the written warning, he or she may be denied permission to register for the next term.

Involuntary Separation from the School for Academic Reasons
A student may be denied permission to reregister at the end of any term when or he or she has failed:

1) to establish good standing after a semester on warning;
2) to maintain an average of 1.7 in any term 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 term or has a term average of 1.0 or below.

The Academic Standards and Scholarship 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 1.7.

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 term;
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 is assigned when the 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 evidence in a course. A firm and definite agreement on the conditions under which it may be made up must be made with the instructor. The school's policy allows a maximum of two full terms 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 a number of 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 concentrate in a particular area of specialization in the school of the sciences. Students considering this program should consult a counselor in the Office of Student Services after their freshman year.

Internships
Many ILR students decide to participate in the ILR Credit Internship Program, working in cities all over the country, typically during the junior year. Most sponsors expect that interns will have completed the introductory required courses before coming to work with them, so the junior year is the earliest opportunity to test out what has been learned in the classroom. The majority of ILR interns will be located in either New York City or Washington, D.C. Contact ILR's Off-Campus Programs office and visit Professor Clete Daniel's ILR Credit Internship website at www.ilr.cornell.edu/creditinternships/.

Summer Internships
What is a summer internship? If, during the summer, you work in a job that is related to industrial relations and you are paid for it, you may be in an internship. Your employer refers to that employment as an internship. Their terminology differs from that used by ILR and Cornell to refer to credit-bearing internships. Academic credits earned at ILR consider internship as a learning experience engaged in during the academic year, for which you earn academic credit, are supervised by a faculty member, and graded by an instructor. The school's policy allows a maximum of two full terms of residence for the removal of a grade of incomplete. If it is not made up within this time, the grade automatically becomes an F.

Programs in Washington
Two Washington programs are available to ILR students: the ILR Credit Internship Program and the Cornell in Washington program, sponsored through the College of Arts and Sciences.

ILR Credit Internship Program: Interns work approximately 30 hours per week for the 15 weeks of the semester, in ILR-related organizations approved by the ILR faculty. They also work on a research project related to their internship, which is graded by their ILR faculty supervisor. The credit hours that they earn are ILR elective credits.

Internships are available in New York City and Washington, D.C., as well as other locations. Cornell in Washington interns find placement in practically any field and every operation in Washington, work there about 20 hours per week, and attend Cornell classes taught in Washington by Cornell faculty. They are expected to complete a major research project, which is related to their course work and internship and for which they receive a grade.

Selecting a program: Most ILR students who wish to intern in Washington, D.C., apply to the ILR Credit Internship Program. Occasionally, an ILR student identifies an interest that cannot be met by the ILR program. The student may then apply to the Cornell in Washington program, which has a credit internship program. Occasionally, students are expected to discuss the program with Professor Daniel, ILR's academic coordinator for internships, before proceeding with applications.

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 Honors. A student interested in writing a research project, an honors thesis, for review by the Committee on Academic Standards and Honors. A student interested in writing a research project, an honors thesis, must have a faculty sponsor. The credit internship, which is graded by the ILR faculty supervisor, is an ILR elective credit.

Study Abroad
Students in ILR who plan to study in another country usually do so in the junior year, occasionally in the senior year. They may study in one of the programs that is approved by ILR, in one sponsored by another institution and endorsed by Cornell, or in an approved externally sponsored program. Information about study abroad is available in OSS (101 Ives Hall) or the Cornell Abroad Office (300 Caldwell Hall).

Students are expected to register for a full course load, the equivalent of 15 credit hours in a semester or 30 hours in a year, when they study abroad. Some courses will be the equivalent of general elective credit or distribution credit, but others may be accepted as ILR elective credit if evaluated and approved by the relevant ILR department. A student may satisfy up to 9 hours of the ILR elective requirement in a single semester abroad and up to 15 hours in a year of foreign study.

Application for foreign study requires that the student meets the schedules of the program of interest and Cornell's schedule. An application includes the student's curriculum, recommendations from faculty, approval of the application by ILR, and transcripts. Approved in ILR, the application is sent to Cornell Abroad and then to the program for which the student is applying. For more information, contact Kevin Harris.

ILR Abroad scholar coordinator, 101 Ives Hall, 607-255-2223, khm@cornell.edu.

COLLECTIVE BARGAINING, LABOR LAW, AND LABOR HISTORY

ILRCB 100 Introduction to U.S. Labor History: Nineteenth Century
Fall, 3 credits. J. Cowie, C. Daniel, I. DeVault, and N. Salvatore.

ILRCB 101 Introduction to U.S. Labor History: The Twentieth Century

ILRCB 201 Labor and Employment Law
Fall and one section in spring, 3 credits. M. Gold, J. Gross, R. Lieberwitz, and K. Stone.

ILRCB 300 Collective Bargaining

A comprehensive introduction to industrial relations and collective bargaining in the United States, the negotiation, scope, and day-to-day administration of contracts, and the major substantive issues in bargaining, including their implications for public policy, industrial conflict, and major challenges facing unions.
and employers today, U.S. industrial relations in international and comparative perspective.

ILRCB 301 Labor Union Administration
Fall 3 credits. Staff.
Study and analysis of the structure and operations of American unions. Including the complexities 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 many different sections of internal union governance; 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 that began in the sixties and continues today. All of these involve a study of union constitutions and other primary documents, in addition to secondary readings. Attention is given to relevant legislation, current problems of unions, and the eternal problems of attaining union democracy.

ILRCB 302 Strangers and Citizens: Immigration and Labor in U.S. History
Fall or spring. 3 credits. I. DeVault.
This course explores immigrant workers' experiences in the nineteenth and twentieth centuries from the perspective of the immigrants themselves. Students examine what it meant to the immigrants to arrive as strangers in the United States while also examining the ways in which pre-existing 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. Throughout the course our main examples come from the industrial and union realms.

ILRCB 303 Working-Class America in Mass Media and Popular Culture
Spring. 3 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 these forces influence our notions of authenticity, the historical experience, and the politics of social class.

ILRCB 304 Seminar in American Labor and Social History
Fall or spring. 4 credits. Permission of instructor; C. E. Daniel, I. DeVault, and N. Salvatore.
An undergraduate seminar whose topic changes depending on semester and instructor.

ILRCB 305 Introduction to Labor Arbitration and Alternative Dispute Resolution
Fall. 3 credits. J. Gross.
An introductory 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 306 Recent History of American Workers: From the 60s through the 90s
Fall. 3 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 covered 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 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 307 U.S. Business History Since the Civil War
Spring. 3 credits. R. Applegate.
Surveys the history of U.S. business enterprise since the establishment of a nationally unified political economy. The course focuses on the corporation's emergence as the dominant form of business in the context of the changing government-business relations. Students examine distinctive features of American business development—such as the preeminence of "big business," corporate governance by the board of directors, 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 308 Women and Unions (also FGSS 384)
Fall or spring. 4 credits. I. DeVault.
This course explores women's participation in the United States labor movement in the nineteenth and twentieth centuries. Issues covered include gender, women workers' relations with male-dominated union movements, the role of cross-class alliances of women in organizing women workers, interactions with radical parties and organizations, problems faced by women union leaders and activities, and others.

ILRCB 385 African American Social History, 1865-1910: The Rural and Urban Experience
Fall. 3 credits. N. Salvatore.
Examines the experience of black Americans from Emancipation through the experience of the first generation born after slavery. Topics include how the changing nature of work, political organization and the rise of Jim Crow, protest, accommodation, and separatism; and the continued evolution of black social and cultural experiences after slavery.

ILRCB 386 African American Social History, 1910-1960: Race, Work, and the City
Spring. 3 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 400 Union Organizing
Spring. 3 credits. Prerequisites: ILRCB 201 and 300; graduate students, ILRCB 500 and 501. K. Bronfenbrenner.
Explores various aspects of unionization efforts to organize workers: 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 unionism.

ILRCB 401 My Brother's Keeper: Volunteerism and Philanthropy
Spring. 3 credits. Junior or senior or permission of instructor. M. Gold.
The philosophy, practice, economics, and law of volunteering labor and donating money. Topics include altruism versus self-interest; why individuals volunteer labor and raise and donate money; the structure and practices of charitable organizations; the economic effects of voluntary labor and philanthropic gifts; and the law of raising and distributing money.

ILRCB 403 Contract Administration
Fall. 3 credits. Prerequisites: ILRCB 300 and 201 or ILRCB 500 and 501. K. Bronfenbrenner.
This course focuses on the practice, nature and challenges of union representation under collective bargaining agreements. Working with union contracts, constitutions, and by­laws 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 representativeness, 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, down-sizing, 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 407 Contemporary Trade Union Movement
Spring. 3 credits. Prerequisites: ILRCB 300, 337. Undergraduate, ILRCB 100; graduate students, ILRCB 502. R. Seeger and R. Hurd.
An examination of contemporary trade union issues, including union power, political action, collective bargaining approaches, and organizing efforts. The course covers structural, functional, and strategic aspects of contemporary unions. Speakers from the union movement will address the class.

ILRCB 482 Ethics at Work
Fall or spring. 3 credits. Prerequisites: junior or senior or permission of instructor. M. Gold.
Major theories of ethics are examined, then applied to issues in the employment relationship such as genetic screening of job applicants, randomness of employees, affirmative action, discipline for off-duty conduct, whistle-blowing, worker safety and cost-benefit analysis, comparable
A comprehensive introduction to the industrial relations system of the United States. 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 501 Labor and Employment Law
Fall. 3 credits. Open only to graduate students. L. Craiga, M. Gold, R. Lieberwitz, and K. Stone.
A survey and analysis of the law governing labor relations and employee rights in the workplace. The first half of the course examines the legal framework in which collective bargaining takes place, including union organizational campaigns, negotiations for and enforcement of collective bargaining agreements, and the use of economic pressure. The second half of the course surveys additional issues of rights in employment, including such topics as employment discrimination, the developing law of "unjust dismissal," and union democracy. Also serves as an introduction to judicial and administrative systems.

ILRCB 502 History of Industrial Relations in the United States since 1865
Spring. 3 credits. Open only to graduate students. C. Daniel, I. DeVault, and N. Salvatore.
This introductory survey course emphasizes historical developments in the twentieth century. Special studies include labor union struggles over organizational alternatives and such other topics as industrial conflicts, working-class lifestyles, radicalism, welfare capitalism, union democracy, and the expanding authority of the federal government.

ILRCB 504 The U.S. Industrial Relations System
4 credits. Offered only in New York City for the M.P.S. Program. Staff.
Examines the development, operation, and outcomes of the U.S. industrial relations system in a comparative context. Specifically, the course contrasts the American experience with industrial relations institutions and outcomes with the experience of several other countries in Europe and Asia. Students look at the process of union formation, the practice of collective bargaining at different levels, the methods of dispute resolution, and the legal regime in Germany 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 602 Arbitration
Fall and spring. 4 credits. Limited to 21 students. Prerequisites: ILRCB 201, 300, 500, 501, J. Gross, and R. Lieberwitz.
A study of arbitration in the field of labor-management relations, including an analysis of principles and practices, the law of arbitration, the role played by industrial relations and human resource policy in economic and social development in these nations is addressed.

ILRCB 603 The Economics of Collective Bargaining in Sports
Fall or spring. 3 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 604 Theories of Equality and Their Application in the Workplace
Fall or spring. 3 credits. R. Lieberwitz.
An examination of theories of equality in the workplace, focusing on issues of race, gender, and national origin, and the ways in which societal discrimination on these bases are institutionalized in the workplace. Theories attempting to define "equality" and specific workplace issues are studied, including the means for achieving equality at the workplace. The course entails a high level of student participation in class discussions, and assignments include a research paper.

ILRCB 605 Readings in the History of Industrial Relations in the United States
Fall. 3 credits. Limited to seniors and graduate students. C. Daniel and N. Salvatore.
An intensive seminar covering original printed sources and scholarly accounts for different periods in American history.

ILRCB 606 Theories of Industrial Relations Systems
Fall or spring. 3 credits. Limited to seniors and graduate students. Prerequisites: ILRCB 100, 101, 300, graduate students. ILRCB 500, H. Katz.
This course 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; and research on union decline; and empirical evidence of the impacts of new technology.

ILRCB 607 Values in Law, Economics, and Industrial Relations
Fall and spring. 3 credits. Limited to 21 students. Prerequisites: ILRCB 201, 300, 500, 501, J. Gross.
An examination of the often hidden values and assumptions that underlie the contemporary U.S. systems of employment law, work and business, and industrial relations. Classroom discussions and student research projects use novels and short stories (as well as the literature of industrial and labor relations) to focus on issues such as discrimination, law, economics, and the state-work and business; power, conflict, and protest; and rights and justice.

ILRCB 608 Sex Discrimination and the Law
Fall or spring. 3 credits. Prerequisites: ILRCB 201, 501, or permission of instructor. R. Lieberwitz.
This course examines current legal issues relevant to discrimination on the basis of sex. Among the problems analyzed are sexual harassment, pornography, reproductive rights, prostitution, work-family conflict, inequality in employment opportunities, gay and lesbian rights, welfare rights, and affirmative action.
COLLECTIVE BARGAINING, LABOR LAW, AND LABOR HISTORY

ILRCB 608 Collective Bargaining Simulation
Fall. 3 credits. Open only to juniors, seniors, and graduate students. Limited to 14 students. One evening extended bargaining session is required. H. Kramer.

ILRCB 611 Managing and Resolving Conflict
Fall or spring. 3 credits. Prerequisites: ILRCB 300, 500, a background in economics and the social sciences, or permission of the instructor. D. Lipsky and R. Seебer.

ILRCB 655 Employment Law I
Fall. 3 credits. Prerequisites: ILRCB 201, 501, or permission of the instructor. Classroom presence and participation are mandatory. L. Adler.

ILRCB 656 Employment Law II
Spring. 3 credits. Prerequisites: ILRCB 201, 501, or permission of the instructor. Classroom presence and participation are mandatory. L. Adler.

ILRCB 668 International Labor Law
Spring. 3 credits. Prerequisites: undergraduates, ILRCB 201; graduate students, ILRCB 501. Will fulfill ILRC distribution requirement for ILR students. L. Compa.

ILRCB 672 Seminar in Labor Relations Law and Legislation
Fall or spring. 3 credits. Limited enrollment. Prerequisite: permission of instructor. R. Lieberwitz.

ILRCB 683 Research Seminar in the History of Industrial Relations
Fall or spring. 3 credits. Prerequisites: undergraduates, ILRCB 100 and 101, graduate students, ILRCB 502. C. Daniel, I. DeVault, and N. Salvatore.

ILRCB 684 Employment Discrimination and the Law
Fall or spring. 3 credits. Prerequisites: ILRCB 201/501 or equivalent. M. Gold and R. Lieberwitz.

An examination of the laws against employment discrimination based on race, traditional privacy at work; and the slowly evolving rights of contingent workers in the old and new economies. One study primarily reviews federal and state court decisions and focuses upon the way that employees' rights are advanced or constrained by law. There are considerable reading responsibilities.

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.
Color, religion, sex, national origin, age, and disability.

ILRCB 685 Research Seminar on Trade Unions
Fall or spring. 3 credits. Prerequisite: ILRCB 300 or 500; permission of instructor. S. Kuruvilla. Designed to provide an analytical survey of research on trade unions in the United States. Major topics include unions in politics, unions as complex organizations, public opinion and attitudes toward unions, determinants of union growth and decline, economic and noneconomic effects of unions, internal union government, and commitment and participation in trade union activity. This is a research-oriented course.

ILRCB 686 Collective Bargaining in the Public Sector
Fall or spring. 3 credits. Prerequisites: undergraduates, ILRCB 300 and 201; graduate students, ILRCB 500 and 501. H. Katz. An examination of the development, practice, and extent of collective bargaining between federal, state, and local governments and their employees. The variety of legislative approaches to such matters as representation rights, unfair practices, scope of bargaining, impasse procedures, and the strike against government are considered along with implications of collective bargaining for public policy and its formulation.

ILRCB 687 Introduction to Labor Research
Spring. 3 credits. Limited to 20. 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 has four major goals: 1) to develop the skills to critically evaluate a wide variety of research relating to unions and the workplace; 2) to introduce a number of both quantitative and qualitative research techniques used by unions and those who study the labor movement; 3) to familiarize students with the broad range of library and computer resources that can be used for labor and corporate research; and 4) to provide students an opportunity to design and conduct a research project for a national or local union.

ILR 689 Constitutional Aspects of Labor Law
Fall or spring. 3 credits. R. Lieberwitz. In-depth analysis of the Supreme Court decisions that interpret the United States Constitution as it applies in the workplace. This study 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 703 Theory and Research in Collective Bargaining
Spring. 3 credits. Open to graduate students who have taken ILRCB 500 and ILR 723 or their equivalents. Recommended: a statistics course beyond the level of ILRST 510. Staff. This is a second-level course in collective bargaining that builds on the institutional research covered in ILRCB 500. The existing literature in the area of collective bargaining is appraised for its theoretical and empirical content. Efforts are made to identify and conceptualize the structural determinants of collective bargaining in such areas as the nature of the institutional and employment contexts, the economic forces that affect collective bargaining, and the role of public policy. The method is to identify and conceptualize the structural determinants of collective bargaining in the labor movement. The course is premised on the idea that labor movement revitalization is associated with new career ladders and different kinds of jobs for labor activists and/or careerists.

ILRCB 705 The Economics of Collective Bargaining
Spring. 3 credits. Prerequisites: ILRCB 500; ILRLE 540 (or their equivalents) and an understanding of multiple regression analysis; or permission of instructor. Staff. The focus is on understanding the role of collective bargaining and the factors that affect collective bargaining. The emphasis is on identifying and understanding the theoretical and empirical research that has been done on collective bargaining and its impact on economic outcomes (wages, prices, profits, productivity, earnings inequality, etc.) across the board. The course is premised on the idea that labor movement revitalization is associated with new career ladders and different kinds of jobs for labor activists and/or careerists.

ILRCB 706 Labor in Global Cities
Fall. 3 credits. L. Turner. This course will grow out of research Prof. Turner is conducting that targets selected cities to assess labor movement revitalization by looking at politics, organizing, coalition building, etc., in selected urban contexts. Each student will choose a city of particular interest (for MILR students perhaps for career purposes as well) and become an expert on that city's key unions, key political actors, their political system, and the labor movement. The goal is to understand how the city's key unions, key political actors, and corporations relate to one another and to the labor movement. The course is premised on the idea that labor movement revitalization is associated with new career ladders and different kinds of jobs for labor activists and/or careerists.

ILRCB 707 Negotiations in Practice (also LAW 672)
Fall. 3 credits. S. Kuruvilla. This course aims to provide opportunities for class participants to develop their negotiating abilities for use in organizational and other settings. The course is premised on the assumption that negotiating concepts are best learned through practice which is grounded in rigorous analysis and reflection. While theoretical principles and concepts from various research disciplines (such as social psychology, sociology, and economics) are presented through lectures and readings, this course focuses primarily on improving practical skills. Class participants learn not only to enhance their individual abilities in dyadic and group situations but also to analyze contexts for the most effective application of these skills.

ILRCB 783 Seminar in American Labor History (also HIST 683)
3 credits. Graduate students only. Permission of instructor required. A research paper is required. N. Salvatore. This course explores the relationship of scholarly biographical writing to the field of American social history. More and more historical biographies look to incorporate sociological and psychological techniques and theories in the field of biographical studies. 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.

ILRCB 790 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 796 Workshop in Collective Bargaining, Labor Law, and Labor History
Fall and spring. 3 credits. Limited to M.S. and Ph.D. candidates in the department. S-U grades only. Staff. Designed to provide 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 in the course is expected to make at least one presentation during the year, focusing on the formulation, design, execution, and results of that student's thesis research.

HUMAN RESOURCE STUDIES

ILRHR 260 Human Resource Management
Fall. 3 credits. Open only to ILR students; others by permission. 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 266 Personal Computer Basics
Fall, spring, and summer. 2 credits.
Limited. C. Hornighouse.
Provides basic skills in the use of personal computers using the Windows environment. Course covers the basics of text editing, Microsoft Word, Windows, Microsoft Excel, Access, and Powerpoint. Emphasis is placed on hands-on experience using examples demonstrating human resource issues and PC-based solutions. This course is a prerequisite to several advanced Human Resource Management electives.

ILRHR 360 Human Resource Economics and Public Policy
Fall and spring. 3 credits. Open to sophomores, juniors, and seniors. V. Briggs and J. H. Bishara.
A review of labor-market trends, data collection systems, and theories pertaining to public efforts to develop the employment potential of the nation's human resources and to combat unemployment. The major segments of the nation's educational training enterprise (e.g., public education, higher education, employer-provided training, apprenticeship, and special training programs for the economically disadvantaged) are examined. It also covers policies issues pertaining to welfare reform, direct job creation, worker relocation, economic development and targeted tax credits.

ILRHR 362 Career Development: Theory and Practice
Fall, spring. 2 credits. 7 weeks. Limited to 20. A. M. Gasser.
Covers the components of career management, individual factors, and organizational realities in the development of both careers and organized programs for career management. Two complementary learning tasks are required: information-gathering for career decision making based on self-assessment activities, and comprehension of organizational circumstances and practices encountered as careers develop. Grades are based on short writing assignments and a research paper.

ILRHR 367 Employee Training and Development
Fall. 3 credits. Prerequisite: ILRHR 260. B. Bell.
Faced with increasing competition, global labor markets, and other external factors, firms are strugling to determine the best approaches to training and developing their workforce. This course addresses the issues, concepts, and processes with which firms are wrestling, as well as specific issues related to planning, implementing, and evaluating training and development programs. After completing this course, students 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 456 International Human Resource Management
Fall. 3 credits. Prerequisite: ILRHR 260 or equivalent. L. Nishi.
Illustrates how cultural context affects the structure and implementation of HR practices. The first part focuses on comparative human resource management and the study of how HRM differs across cultures, with a primary emphasis on the American HRM practices with those in East Asia and its secondary focus on Western European HRM practices. Course 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 460 Human Resource Strategies for Entrepreneurial Firms
Spring. 3 credits. Open to juniors and seniors. Prerequisite: ILRHR 260 or permission of instructor. C. Collins.
Explores the human resource problems and solutions specific to start-up firms and growing entrepreneurial organizations. Over the course of the semester, students integrate their knowledge of the functional areas of human resource management with general management, business strategy, entrepreneurship, accounting/finance, marketing, public relations, and small business management. Course material and creative solutions to problems are communicated to the class through lectures, case studies, class and group discussions, and formal presentations. The course emphasizes the integration of concepts, application to real-life business situations, and the acquisition of general management skills and knowledge.

ILRHR 461 Work & the Future Economy: The Sociology of Work
Spring. 3 credits. R. Batt.
Draws on qualitative studies of the workplace to examine how managers and workers are affected by changes in technologies, business strategies, labor markets, and other external 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 462 Staffing and Organizations
Spring. 3 credits. C. Collins.
Seminar designed to provide an overview of the processes through which organizations staff positions with both internal and external applicants. Through a combination of lectures, cases, and projects, the course covers theory, research, and legal foundations that inform organizational staffing actions. Topics covered in this course include staffing strategy and context, measurement of staffing effectiveness, job/career analysis, human resource planning, recruitment and job choice, selection, and external and internal selection practices.

ILRHR 463 Diversity and Employee Relations
Fall. 3 credits. Q. Roberson.
Designed to provide an opportunity for students to understand the importance of, and develop competencies for, promoting organizational justice and building inclusive work environments. The first half of the course focuses on identifying differences and similarities in the experiences, needs, and beliefs of people from diverse backgrounds as well as assessing and managing sensitivity to such differences. The second half of the course focuses on stimulating critical thinking regarding the management of diversity and employee relations in organizations as well as increasing students' knowledge of HR policies and practices designed to manage these issues effectively. To achieve these goals, the course uses an experiential design that includes readings, exercises, cases, and class discussion.

ILRHR 464 Business Strategy
Fall. 3 credits. C. Collins.
Intended to be an integrative course focusing on strategic management. The main purpose of the course is to provide an opportunity for students to study and analyze issues associated with strategic thinking in complex business environments. The course emphasizes 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 resource management) and to apply this knowledge to business problems faced by top management in existing organizations. Class is comprised of both a lecture and case study format.

ILRHR 465 Globalization at Work
Fall. 3 credits. R. Batt.
Seminar that 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 466 Human Resources Management Simulation
Fall. 2 credits. Limited to 30 juniors and seniors. Prerequisite: ILRHR 260 or equivalent. 7 weeks. W. Wasmuth.
Uses a simulation model and an open-systems approach to mean to enhance students' skills in strategic planning and managerial decision making. Attention is given to the implications and efforts of strategic human resource management 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. Regular attendance is mandatory.

ILRHR 469 Immigration and the American Labor Force
Spring. 3 credits. C. Collins.
Assesses the role that immigration policy plays as an instrument of human resource development in the United States. Immigration policy is placed in an evolutionary context but primary attention is given to the 1965 revival of mass immigration. In addition to legal immigration, policies pertaining
to illegal immigration, border commutes, "maquiladoras," refugees, asylees, and nonimmigrant workers are examined. Comparisons are also made with immigration systems of other nations.

ILRHR 495 Honors Program
Fall and spring (yearlong course). 3 credits each term.
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILRHR 497–498 Internship
Fall and spring. 3 and 6 credits.
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILRHR 499 Directed Studies
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILRHR 560 Human Resource Management
Fall and spring. 3 credits. Open to graduate students only. B. Bell.
A survey course covering the major areas of the management of human behavior in work organizations. Consideration is given to aspects of strategic human resource management such as staffing, training and development, performance management, compensation, and employee relations. Emphasis is on exploring these issues from both strategic and tactical levels to increase organizational effectiveness.

ILRHR 564 Human Resources Management in Effective Organizations
Fall or spring. 4 credits. Offered only in New York City for the M.P.S. Program.
Staff.
This course offers 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 653 Research on Education Reform and Human Resource Policy
Spring. 3 credits. J. Bishop.
State and local efforts to improve K-12 education are employing a variety of (sometimes contradictory) reform strategies. A research seminar that 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, smaller classes, direct instruction versus discovery learning, 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 654 Introduction to HR Information Systems
Fall. 1 credit. S-U only. Prerequisites: ILRHR 260 or equivalent. Students must have used Access or a similar database package for at least data entry and report generation. 7 weeks. C. Hornighouse.
Focuses on understanding how and why human resource information systems are developed, managed, and used. 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, we manipulate the data to create reports, forms, and queries to assist in human resource decisions. We examine ways to make databases efficient and consistent. Production database systems such as PeopleSoft are also reviewed and used. All instruction is hands-on and supplemented with assigned readings and guest lecturers.

ILRHR 660 HR Leadership: View from the Top
Fall. 3 credits. Prerequisites: ILRHR 260/560 or equivalents, plus at least two additional courses in HR management and permission of the instructor. Enrollment limit: 30. I. Dyer.
Offers students an opportunity to learn about strategic business and human resource issues from the perspectives of senior HR executives. During the semester, five chief human resources officers (CHROs) representing various segments of the economy meet with the class for lively give-and-take sessions on subjects of topical interest to their organizations. Teams of students host the CHROs. Before the visits, the teams prepare background papers on the speakers, their companies, and their topics. Course participants discuss these papers before the visits to assure readiness to address the issues at hand when the CHROs arrive. After the visits, the teams revise their background papers into white papers that reflect insights picked up during the class sessions as well as informal meetings with the CHROs.

ILRHR 661 Applied Personal and Organization Development
Fall. 3 credits. Prerequisite: ILRHR 260/560 or equivalent. C. Warzinski.
An experiential course that deals with OD and its role in the organizational change process. Combines the opportunity for hands-on training in a workshop setting with examination of the theory and practice of OD. 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 field project requiring a comprehensive proposal that describes an appropriate and logically supported intervention strategy.

ILRHR 662 The Agile Enterprise: Exploring the Dynamics of Marketplaces and Organizational Agility
Fall. 4 credits. Prerequisites: ILRHR 260/560 and additional course work in business and human resource strategy. I. Dyer.
Increasingly, dynamic environments are encouraging active experimentation with new (i.e., nonbureaucratic) organizational paradigms. One such paradigm is the agile enterprise. This course explores the dynamics of the agile enterprise with particular emphasis on underlying justification and rationale, approaches to pursuing marketplace agility, and infrastructure designs and human resource strategies, as well as new approaches to leadership. If learning to operate and live in one is another. Thus this course is mostly experiential and is conducted as much like an agile enterprise as is possible in an academic setting. In pursuit of a vision and armed with a few basic principles, students function autonomously, albeit with accountability, to generate, share, absorb, and use knowledge and experience to enhance their, and others', understanding and appreciation of the pluses and minuses of life in an agile enterprise.

ILRHR 663 Financial Statement Analysis for the HR Professional
Fall. 3 credits. Prerequisite: ILRHR 560 and one course in statistics or permission of instructor. Q. Roberson.
Intended for students with limited knowledge of accounting and finance who want to better understand financial statements and measures that are affected directly or indirectly by the HR function. Provides a comprehensive introduction to financial analysis and cash flow. Focuses on the relationship between HR and an organization's strategic objectives. Emphasis is on understanding the impact of HR decisions on the organization's financial performance. Designed for students who want to better understand the role of HR in the organization's financial performance.

ILRHR 664 HR Online Research and Reporting Methods for Executive Decision-Making
Spring. 3 credits. Prerequisite: ILRHR 560/260 or equivalent. S. Basefsky.
An introduction to online research methods. Students learn to use the Internet to locate and present information for decision-making. Includes an introduction to HTML, databases, and search engines. Emphasis is on using the Internet to locate and present information for decision-making.

ILRHR 665 Business Strategy and Human Resources
Fall. 4 credits. Limited. Prerequisite: ILRHR 260/560 plus 3 other courses in human resource studies and 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 666 Strategic HR Metrics
Spring. 4 credits. Prerequisites: ILRHR 260/560 or equivalent, one course in statistics, one elective in human resource studies. Staff. Human resources are important organizational assets (just as capital, raw materials, and energy are important assets). Recognizing this requires that human resource managers, labor economists and researchers understand how to estimate the value of human resource decisions and how to communicate that value effectively. This includes applying decision making models to human resource activities such as selection, turnover, recruitment, compensation, and training. This seminar introduces the concepts of persuasion, decisions, costs, and benefits and explores how to measure the relevant costs and benefits for resource management decisions. It will also introduce models from other disciplines that are relevant to human resource decisions (e.g., capital budgeting, TQM) and provide an opportunity to develop and apply these decision techniques to situational human resource decisions.

ILRHR 667 Diversity and Inclusion in Organizations
Spring. 4 credits. Prerequisites: ILRHR 560 or permission of instructor. Q. Roberson. Designed to explore diversity management and practices for inclusion in business organizations. Course objectives and goals of the course are to increase students' knowledge of strategic and tactical uses of HR practices and policies to manage organizational diversity issues effectively. Specifically the course aims to develop students' skills in the practical management of diversity, particularly linking diversity strategy to business strategy and developing diversity and inclusion initiatives to help improve organizational competitiveness; and to offer an opportunity to develop and apply these decision techniques to situational human resource decisions.

ILRHR 668 Staffing Organizations
Spring. 3 credits. Prerequisites: ILRHR 260 or equivalent, one course in statistics or permission of instructor. C. Collins. 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 covered include staffing strategy and context, measurement of staffing effectiveness, job design, human resource planning, recruitment and job choice, and internal and external selection practices.

ILRHR 669 Managing Compensation
Spring. 4 credits. Limited to 30 students. Prerequisites: ILRHR 260/560 or equivalent, ILRHR 260 and basic statistics or permission of instructor. Staff. Focuses on managing employee compensation in contemporary organizations. The major objectives are to examine the current state of compensation decision making, to examine how recent theoretical and research developments inform compensation decisions, and to offer an opportunity to develop competencies in making compensation decisions.

ILRHR 690 Comparative Human Resource Management
Fall. 3 credits. Prerequisites: ILRHR 260/560 or permission of instructor, L. Nishi. Provides students with an understanding of the complexities associated with international human resource management. The central theme of the course is to identify whether and in what ways HRM practices need to be adapted across cultures to be effective. Course material reflects a focus on comparing American HRM practices with those in East Asia and Western Europe. In addition, the major topic areas of concern to HRM managers are covered, including the selection, training, compensation, and performance management of global managers (expatriates), coordination across subsidiaries of a company, the development and tracking of global leaders, and cross-cultural communication and negotiation.

ILRHR 693 Training and Development in Organizations
Spring. 3 credits. Prerequisites: ILRHR 560 or permission of instructor. B. Bell. The purpose of this course is to acquaint students with aspects of learning in organizations. We begin by discussing organizational learning, and then focus more narrowly on specific ways in which learning is achieved through the training and development functions. Topics throughout the semester 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 694 Competing in Services: Management, Marketing, and HR Strategies
Fall. 3 credits. Prerequisite: HR 560 or equivalent and permission of instructor. R. Bait. Examines alternative service management strategies and outcomes, with particular focus on customer relationship management. Priority is given to analyzing the relationship between business strategy, marketing, customer segmentation, organizational structures, and human resource practices. Student projects focus on critical analysis of service management in particular companies and settings, using live cases where possible.

ILRHR 695 Education, Technology, and Productivity
Fall. 3 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 change 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 in recent years; and the responsibility for education and training should be apportioned among individuals, firms, private nonprofit organizations, and government.

ILRHR 696 Knowledge Management
Fall. 3 credits. Open to seniors and graduate students. S. Snell. Designed to acquaint students with the systems and strategies used to manage a firm's intellectual capital. Focus is on foundation concepts and frameworks related to intellectual capital (human, social, and organizational), knowledge management, and HRM. Discussions cover both the point of view of the organization (e.g., competitive challenges, core competencies) and the employees (e.g., psychological contracts, employment relationships). Ultimately, the goal is to integrate these views to develop a framework of how both the organization and the individual maximize the opportunities to drive knowledge management. In particular, students focus on how firms create, transfer, and integrate knowledge to support learning and innovation. We discuss the managerial methods that support knowledge processes and cover various models and frameworks for integrating elements of knowledge management and intellectual capital.

ILRHR 697 Special Topics in Resource Studies
Fall or spring. 3 credits. Staff. Areas of study are determined each semester by the instructor offering the seminar.

ILRHR 698 International Human Resource Policies and Institutions
Spring. 3 credits. J. Bishop. A comparative study of human resource policies and institutions in Western Europe, North America, Japan, and China (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 attempt 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 699 Advanced Desktop Applications
Spring. 1 credit. Letter grade only. Prerequisite: ILRHR 260 or significant experience (2-4 years) using office applications. C. Hornig. Explores advanced topics for common desktop applications including Windows, Word, Excel, Access, PowerPoint, and basic HTML. The course is designed based on student input and instructor recommendations, covering those subjects that students feel would be most useful and relevant in the job market. Examples of areas include working with tables, columns, or sections in Word, pivot tables in Excel, Access, PowerPoint presentaton "on the road", and using just tables to create relationships in Access.

ILRHR 760 Seminar in Human Resource Studies
Fall or spring. 3 credits. Prerequisites: ILRHR 560, ILRST 510/511, and ILRHR 669 and permission of instructor. Staff. A "floating" seminar designed to give faculty and students an opportunity to pursue specific
topics in detail, with an emphasis on theory and research. Topics vary from semester to semester. Interested students should consult current course announcements for details.

**ILRHR 763 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 765 International Compensation**
Spring. 4 credits. Staff. Seminar focuses on international developments in employee compensation. Recent research, theoretical developments, and specific organizations’ practices in a wide variety of countries are considered. Local national practices are the principal focus along with expatriates and others. The course draws upon research and theories from sociology, economics, and industrial relations.

**ILRHR 790 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 797 Internship**
For description, see the section Collective Bargaining, Labor Law, and Labor History.

**ILRHR 799 Directed Studies**
For description, see the section Collective Bargaining, Labor Law, and Labor History.

**ILRHR 960 Workshop in Human Resource Studies**
Fall and spring. 2 credits. Enrollment limited to M.S. and Ph.D. candidates. S-U grades only. Staff. Provides a forum for the presentation and critical discussion of current research being undertaken by graduate students, faculty members, and invited guests in the field of human resource studies. All M.S. and Ph.D. candidates in the Department of Human Resource Studies are urged to enroll; candidates in other departments are cordially invited. Each participant has an opportunity to benefit from the collective wisdom of the others in the formulation, design, and execution of his or her research, as well as to become current on the latest developments in the field.

**ILRHR 961 Doctoral Research Seminar in Human Resource Management**
Fall. 3 credits. Ph.D. candidates only. Staff. This seminar is 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 962 Doctoral Research Seminar in Strategic Human Resource Management**
Spring. 3 credits. Ph.D. candidates only. Staff. Seminar is 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 963 Research Methods in HRM/Strategic Human Resource Management**
Spring. 3 credits. Ph.D. candidates only. Not offered 2004–2005. 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**

**ILRHR 333 Politics of the Global North**
Fall. 3 or 4 credits. (1 additional credit may be arranged). L. Turner. Current global debates, comparative political economy of Europe, the United States, and Japan, with a focus on labor, environmental, antinuclear, and campus coalitions for domestic reform and global justice.

**ILRHR 337 Special Topics**
Fall. 3 or 4 credits. Not offered 2004–2005. Staff. Devoted to new topics in the field. The specific content and emphasis vary depending upon the interests of the faculty member teaching the course.

**ILRHR 339 The Political Economy of Mexico**
Spring. 3 credits. M. Cook. Explores the range of challenges affecting contemporary Mexican politics, society, and economic development—from democratization to immigration to NAFTA. The course provides an introduction to Mexican political economy for those with no prior background and an opportunity for students with more knowledge of Mexico to explore a research topic in greater depth.

**ILRHR 499 Directed Studies**
For description, see the section Collective Bargaining, Labor Law, and Labor History.

**ILRHR 532 Politics of the Global North**
Fall. 4 credits. Graduate students. L. Turner. See description for ILRHR 333. Graduate students also submit an analytical term paper at the end of the semester.

**ILRHR 537 Special Topics**
Fall or spring. 3 or 4 credits. Not offered 2004–2005. Staff. Devoted to new topics in the field. The specific content and emphasis vary depending upon the interests of the faculty member teaching the course.

**ILRHR 631 Comparative Labor Movements in Latin America**
Fall. 3 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 democratization on contemporary labor organizations in the region. Countries examined include, but are not limited to, Mexico, Brazil, Argentina, Chile, Peru, and Guatemala.

**ILRHR 632 Revitalizing the Labor Movement: A Comparative Perspective**
Spring. 4 credits. Graduate seminar open to seniors only with permission of instructor. L. Turner. Examines contemporary efforts in the United States and Europe to revitalize unions and reform industrial relations. The first half of the course examines contemporary reform efforts in the United States. The second half covers Britain, Germany, Italy, Spain, the "Europeanization" of labor, and related topics depending on student interest.

**ILRHR 633 Labor, Industry, and Politics in Germany**
Fall. 4 credits. Open to seniors with permission and graduate students. Not offered 2004–2005. L. Turner. Is the successful postwar "social partnership" model of organized capitalism in the Federal Republic of Germany viable in the twenty-first century? To answer this question, this course looks at the works councils and codetermination, the rise of a strong postwar labor movement, the contemporary German version of social partnership, with an emphasis on current events and the new challenges for German industry and labor posed by German unification and European integration.

**ILRHR 635 Labor Markets and Income Distribution in Developing Countries**
Spring. 4 credits. Prerequisite: ILRLE 240/540 or ECON 513 or permission of instructor. G. Fields. A course analyzing who benefits and how much from economic growth in developing countries and how income distribution would be affected by various public policies. Topics to be covered include poverty, inequality, economic mobility, and social welfare; poverty profiles, earnings functions, and decompositions; unemployment, wages, and labor markets; and an introduction to public economics and development policy.

**ILRHR 636 Comparative History of Women and Work (also WOMNS 636)**
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 2004–2005. I. DeVault. Explores the similarities and differences between different cultures’ assumptions about the work of women as well as women’s experiences in changing work circumstances throughout history. Beginning with theoretical pieces and overviews of the history of women and work, most of the course consists of in-depth examinations of specific work situations
Faced with the competitive pressures brought on by globalization, employers and governments throughout the region are transforming practices, laws, policies, and institutions that shape the industrial relations arena. The course analyzes and compares the extent and character of these changes, the responses and strategies of trade unions and other political and social actors, and the implications of industrial relations changes in the region for economic development, political stability, and democracy. The aim is to introduce students to the key issues in contemporary Latin American industrial relations and, through individual research papers, to enable students to become familiar with a specific country or sector/theme in two or more countries of the region.

**ILRIC 737 Special Topics: Labor, Democracy, and Globalization in the South**

Spring. 3 credits. M. Cook. Labor movements in developing countries face distinct challenges from those in advanced industrial countries. The course will examine two of the most important recent changes to affect countries in the developing “South” in recent years: democratization and the adoption of market-oriented economic reforms. It will focus on how these “dual transitions” affect workers and labor organizations in developing countries and on labor’s responses to political and economic change. Among the issues we will examine are labor’s role in political democratization, factors driving market reform and labor responses, the effects of economic liberalization on labor, national versus industry analyses of change, labor law and policy reform, national protections for labor rights and international labor standards, global trade and Southern country alliances, issues in North-South labor relations, and more.

**ILRLE 448 Topics in Twentieth-Century Economic History: The Economics of Depression and the Rise of the Managed Economy**

Fall. 1 credit. Open only to ILR freshmen.

For description, see the section Labor Economics.

**ILRHR 465 The Globalization of Services**

Fall. R. Batt.

For description, see the section Human Resource Studies.

**ILRHR 469 Immigration and the American Labor Force**

Spring. V. Briggs.

For description, see the section Human Resource Studies.

**ILRHR 690 Comparative Human Resource Management**

Fall. Staff.

For description, see the section Human Resource Studies.

**ILRHR 698 International Human Resource Policies and Institutions**

Spring. G. Boyer.

For description, see the section Labor Economics.

**ILRHR 646 Economic History of British Labor (also ECON 459)**

Spring. G. Boyer.

For description, see the section Labor Economics.

**ILRHR 464 The Evolution of Social Policy in Britain and America**

Spring. J. Bishop.

For description, see the section Labor Economics.

**ILRHR 456 International Human Resource Management**

Spring. Staff.

For description, see the section Labor Economics.

**ILRHR 458 Immigration and the North-South Labor Relations (also ECON 459)**

Spring. R. Batt.

For description, see the section Labor Economics.

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Spring. R. Batt.

For description, see the section Labor Economics.
ILLR 566 Public Policy
Spring. 4 credits. Offered only for the New York City M.P.S. Program. Staff.
The government's influence on the workplace and the economy; its role 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.

ILLR 790 ILR M.P.S. Program
Fall and spring. 1-9 credits.
Supervised research only for those enrolled in the ILR M.P.S. program.

LABOR ECONOMICS

ILLR 140 Development of Economic Institutions
Fall. 3 credits. Prerequisite for non-ILR students: permission of instructor. G. Boyer.
Examines the development of economic thought and policy from the seventeenth century to the present, focusing on the relationship between economic development and the evolution of economic policy. Readings are drawn from the writings of some of the greatest social scientists of the previous two centuries, including Adam Smith, Thomas Malthus, John Stuart Mill, Karl Marx, Friedrich Engels, and John Maynard Keynes.

ILLR 240 Economics of Wages and Employment
Fall and spring. 3 credits. Prerequisites: ECON 101-102 or permission of instructor. Applies the theory and elementary tools of economics to the characteristics and problems of the labor market. Considers both the employment (employer) and supply (employee) sides of the market to gain a deeper understanding of the effects of various government programs and private decisions targeted at the labor market. Topics covered include demographic demand, basic compensation determination, education and training, and the effects of unions.

ILLR 340 Economic Security (also ECON 451)
Spring. 3 credits. Prerequisites: ILLR 240 or equivalent. Considers the economic and social effects of income security measures. Analyzes programs offering protection against economic loss due to industrial accident, temporary and permanent disability, illness, old age, premature death, and unemployment, as well as private efforts to provide security, and the problems of integrating public and private programs. Proposals for amending or modifying existing security measures are also considered.

ILLR 440 Compensation, Incentives, and Productivity (also ECON 341)
Spring. 3 credits. Prerequisites: ILLR 240 or equivalent. ILLR students may substitute ILRLE 440 for 240 with permission of instructor. J. Devaro. See ILRLE 240 for description. Designed for ECON majors with calculus.

ILLR 441 Income Distribution (also ECON 455)
Fall. 4 credits. Prerequisite: ILLR 240 or ECON 341. R. Hutcherson.
Explores income distribution in the United States and the world. Topics to be covered include functional and size distributions of income, wage structure, income-generating functions and theories, discrimination, poverty, public policy and income distribution, and changing income distribution and growth. Students who have taken ECON 370 may not receive credit for 441.

ILLR 442 The Economics of Employee Benefits (also ECON 456)
Fall. 4 credits. Prerequisites: ILLR 240 or equivalent. G. Boyer.
An in-depth treatment of the economics of labor market and financial management and administration of employee benefits: health care, insurance, retirement income, family-care benefits, executive incentive plans, and other compensation provided as a service or contingent financial package to employees. Detailed international comparisons of health care and retirement systems are included.

ILLR 443 Personnel Economics for Managers (also ECON 443)
Fall. 4 credits. Prerequisites: ILLR 240 or equivalent. J. Devaro.
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. The course also considers workplace business problems using the analytical tools of economic theory and should appeal to students contemplating careers in general business, consulting, and human resource management as well as in economics.

ILLR 444 The Evolution of Social Policy in Britain and America
Spring. 4 credits. Prerequisite: ILLR 240 or equivalent. G. Boyer.
Surveys the history of social policy in Great Britain and the United States from 1800 to the adoption of the British welfare state after World War II. Topics covered include the role of poor relief in the early nineteenth 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.

ILLR 445 Women in the Economy (also ECON 457 also FGSS 446)
Fall. 4 credits. Prerequisite: ILLR 240 or equivalent. Staff.
Examines the changing economic roles of women and men in the labor market and in the family. Topics include a historical overview of changing gender roles; the determinants of the gender division of labor.
in the family; trends in female and male labor force participation; gender differences in occupations and earnings; the consequences of women's employment for the family, and a consideration of women's status in other countries.

ILRLE 446 Economic History of British Labor 1750-1940 (also ECON 459)
Fall or spring. 4 credits. Prerequisite: ILRLE 240 or equivalent. G. Boyer.
Examines topics of British labor history from the beginning of the Industrial Revolution until World War II. Specific topics include monetary and nonmonetary changes in workers' living standards, internal migration and emigration; the London labor market; the extent of poverty, and the evolution of the welfare state; Luddism and Chartism; and the development of trade unions.

ILRLE 447 Social and Economic Data (also ILRLE 740 and INFO 447)
Spring. 4 credits. Prerequisites: one semester of calculus, the IS statistics requirement, at least one upper-level social science course or permission of instructor. J. Abowd.
Designed to teach the basics required to acquire and transform raw information into social and economic data. Legal, statistical, computing, and social science aspects of the data "manufacturing" process will be treated. The formal US, Eurostat, OECD, and UN statistical infrastructure will be covered. Major private data sources will also be covered. 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. Grading will be based on a group term project.

ILRLE 448 Topics in Twentieth-Century Economic History: The Economics of Depression and the Rise of the Managed Economy (also ECON 458)
Spring. 4 credits. Prerequisites: ILRLE 240 or ECON 341. 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. The course 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 490 Honors Program
Fall and spring (yearlong course). 3 credits each term.
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILRLE 497-498 Internship
Fall and spring. 3 and 6 credits.
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILRLE 499 Directed Studies
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILRLE 540 Labor Economics
Fall. 3 credits. Prerequisites: ECON 101–102 or ECON 105 or equivalent. Required of M.I.L.R. students.
A course in labor market economics for prospective managers in the corporate, union, and governmental sectors. The course begins with demand and supply in labor markets, presenting the tools of decision analysis for workers and firms. It then goes on to consider various topics for managers including deciding on the optimal mix of capital and labor to employ; attracting and retaining talent; pay and productivity; training, investments, and pensions and retirement. The final section of the course covers other important labor market issues including unemployment, discrimination, poverty and inequality, and analysis of public policies.

ILRLE 544 Labor Market and Personnel Economics
A 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 to have students learn to analyze both business and public policy problems, taking into account both basic principles of economic theory and the relevant institutional environments.

ILRLE 642 Economic Analysis of the Welfare State (also ECON 460)
Spring. 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 648 Economic Analysis of the University (also ECON 342)
Fall. 4 credits. Staff.
Seeks to illustrate the complexity of decision making in a nonprofit organization and to show how microeconomic analysis can be applied to analyze resource allocation decisions at universities. Among the topics covered are financial aid, tuition, admissions policies, retention policies, merit pay, affirmative action, comparable worth, collective bargaining, resource allocation across and within departments, graduate education, research costs, libraries, athletics, and "socially responsible" policies. Lectures and discussions of the extensive readings are supplemented by presentations by Cornell administrators and outside speakers who have been engaged in university resource allocation decisions or have done research on the subject.

ILRLE 740 Social and Economic Data (also INFO 447)
Spring. 4 credits. J. Abowd.
Designed to teach the basics required to acquire and transform raw information into social and economic data. There is special emphasis in the graduate materials on methods for creating and certifying laboratories in which data privacy and confidentiality concerns are controlled and audited. Legal, statistical, computing, and social science aspects of the data "manufacturing" process are treated. The formal US, Eurostat, OECD, and UN statistical infrastructure are covered as are major private data sources. Topics include basic statistical principles of populations and sampling frames; acquiring data via samples, censuses, administrative records, and transaction logging; the law, economics, and statistics of data privacy and confidentiality protection; data linking and integration techniques (probabilistic record linking; multivariate statistical matching); analytic methods in the social sciences. Graduate students are assumed to be interested in applying these techniques to original research in an area of specialization, and are required to do individual projects.

ILRLE 741 Applied Econometrics I (also ECON 748)
Fall. 4 credits. S-U or letter. Prerequisites: graduate core sequence in econometrics or permission of instructor. G. Jakubson.
Considers methods for the analysis of longitudinal data, that is, data in which a set of individuals are followed over time. Focus is 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 742 Applied Econometrics II (also ECON 749)
Spring. 4 credits. Letter or S-U grades. Prerequisite: ILRLE 741 or permission of instructor. G. Jakubson.
Continues from ILRLE 741 and covers statistical methods for models in which the dependent variable is not continuous. Covers: models for dichotomous response (including probit and logit); polytomous response (including ordered response and multinomial logit); various types of censoring and truncation (e.g., the response variable is only observed when it is greater than a threshold); and sample selection issues. Includes an introduction to duration analysis. Covers not only the statistical issues but also the links between behavioral theories in the social sciences and the specification of the statistical model.

ILRLE 743 Applied Econometrics III
Spring. 4 credits. Letter only. Prerequisites: ILRLE 741–742 or permission of instructor. ILRLE 741, 742, and 743 constitute a Ph.D.-level sequence in applied microeconometrics. G. Jakubson.
Covers topics not covered in ILRLE 741–742, including further treatment of duration analysis, panel data methods for nonlinear models, quantile regression and related techniques, and an introduction to
Additional topics as suggested by their use in applied areas of social science. Covers not only the statistical issues but also the links between behavioral theories in the social sciences and the specification of the statistical model. Also develops a general framework for the techniques covered in the ILRLE 741-742-743 sequence.

ILRLE 744 Seminar in Labor Economics I (also ECON 747)
Spring. 3 credits. ILRLE 744, 745, and 746 constitute the Ph.D.-level sequence in labor economics.
Course includes reading and discussion of selected topics in labor economics. Applications of economic theory and econometrics to the labor market and human resource areas are stressed.

ILRLE 745 Seminar in Labor Economics II (also ECON 742)
Fall. 3 credits. ILRLE 744, 745, and 746 constitute the Ph.D.-level sequence in labor economics.
Course includes reading and discussion of selected topics in labor economics. Applications of economic theory and econometrics to the labor market and human resource areas are stressed.

ILRLE 746 Seminar in Labor Economics III (also ECON 743)
Spring. 4 credits. ILRLE 744, 745, and 746 constitute the Ph.D.-level sequence in labor economics.
Course includes reading and discussion of selected topics in labor economics. Applications of economic theory and econometrics to the labor market and human resource areas are stressed.

ILRLE 747 Economics of Education (also ECON 647)
Spring. 4 credits. R Ehrenberg.
A survey of the econometric research on a wide variety of higher education issues. Examples of the issues addressed include: at the higher education level public and private funding, financial aid and tuition policies, faculty labor markets, and Ph.D. production. Examples at the elementary and secondary level include school finance policies, the class-size debate and teacher labor markets. Interested students other than economics and labor economics Ph.D. students should speak to the instructor before enrolling for the course.

ILRLE 748 Economics of Employee Behavior (also ILROB 748)
Fall. 4 credits. Staff.
Students in this course attend the lectures in ILRLE 442 (see description for 442) but have additional course requirements. If enrollment warrants, they will also meet separately at a time TBA for discussion of topics in 442 and additional topics.

ILRLE 749 Economics of Development (also ECON 772)
Fall. 4 credits. Prerequisites: first-year graduate economic theory and econometrics. Staff.
Analytical approach to the economic problems of developing nations. Topics to be covered include old and new directions in development economics thinking; the welfare economics of poverty and inequality; empirical evidence on benefits from economic development; labor market models; project analysis with application to the economics of education; and development policy.

ILRLE 790 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 798 Internship
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILRLE 799 Directed Studies
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILRLE 940 Workshop in Labor Economics
Fall and spring. 3 credits. Intended for Ph.D. students who have started to write their dissertations.
Presentations of completed papers and work in progress by faculty members, advanced graduate students, and speakers from other universities. Focus is on the formulation, design, and execution of dissertations.

ORGANIZATIONAL BEHAVIOR

ILROB 170 Introduction to Micro-Organizational Behavior and Analysis: The Social Psychology of the Workplace
Fall. 3 credits. Staff.
This introductory (survey) course considers the basic individual and group processes in the workplace. At the individual level, students study personality, motivation, perception, attitude formation, and decision making. On the group level, group dynamics, leadership, power and influence, and culture are emphasized.

ILROB 171 Introduction to Macro-Organizational Behavior and Analysis
Spring. 3 credits. Staff.
The relationship between industry and the economy as a whole and its implications for other social institutions in American society (including religion and education, and American values) is discussed. The course moves from classical sociological theory to the analysis of complex organizations. The central focus of the course is the study of industrial organizations and of complex organizations in general, emphasizing authority relations, goals, the division of labor, bureaucracy, and organizational design.

ILROB 320 The Psychology of Industrial Engineering
Fall. 4 credits. T. Hammer.
A study of the human factors in the industrial engineering of work, workplaces, tools, and machinery. The course 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 321 Group Solidarity (also SOC 311)
Fall. 4 credits. M. Macy.
What is the most important group that you belong to? What makes it important?
What holds the group together, and how might it fall apart? How does the group recruit new members? Make and enforce rules? Do some members perform 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. Also considered are group solidarity in 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.

ILROB 322 Service Learning (also SOC 323)
Fall. 4 credits. M. Lonshury.
Service-learning is a course-based, credit-bearing educational experience in which students participate in organized service that contributes to community well-being. Students reflect on their course of understanding of service, a broader appreciation of the discipline, and an enhanced sense of civic responsibility. The course includes a service-learning requirement that is designed to involve students in projects at local governmental and community organizations. Students draw on sociological readings to examine the relationship between organizations, society, and social change. Theoretical perspectives learned in class complement field-based activity; students develop a richer understanding of how organizations and their members are connected to society.

ILROB 329 Organizational Cultures
Fall or spring. 3 credits. Prerequisite: one or more courses in OB and/or sociology. W. Sonnenstuhl.
Reviews the concept of culture as it has evolved in sociology and anthropology, applying it to formal organizations in workplaces such as corporations and unions. The course first examines the nature of ideologies as sense-making definitions of behavior, concentrating on the cultural forms that carry these cultural messages, rituals, symbols, myths, sages, legends, and organizational stories. Considerable attention is given to rites and ceremonies 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 will also receive attention, especially the part played by occupational subcultures in formal organizations.

ILROB 370 The Study of Work Motivation
Fall. 4 credits. Open to juniors and seniors. T. Hammer.
Designed to acquaint the student with the basic concepts and theories of human motivation with implications for job design and organizational effectiveness. Focus is on theories of worker motivation and on research approaches and results as they apply to the performance of individuals and groups in formal organizations. Readings are predominantly from the field of organizational psychology, supplemented by relevant contributions from experimental and social psychology. Each student designs, executes,
and analyzes a research study of his or her own.

**ILROB 420 Contemporary Organizational Behavior Applications**

Fall or spring. 3 credits. Prerequisites: ILROB 170 and 171. L. Gasser.

An examination of common practical applications of OB theory in organizations. Using a range of contemporary resources, students sit through practitioner articles and research, manage discussions, meet with managers, executives, and employees, and explore organizational issues and problems from micro and macro perspectives in a political and legal context. Students also develop a toolbox of knowledge and skills to effective entry into relevant organizational interventions or development initiatives. Choice of topics may differ to focus on contemporary issues such as emotional intelligence, influencing organizational climate and morale, engaging strategic planning processes, managing large-scale participative techniques, using job or workplace design concepts, applying SWOT analysis, developing effective teamwork, managing diversity, and applying quality management tools.

**ILROB 422 Organizations and Deviance**

Fall or spring. 3 credits. Enrollment limited to 60. W. Sonnenfeld.

Focuses upon 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.

**ILROB 427 The Professions: Organization and Control**

Fall. 3 credits. Prerequisite: permission of the instructor. P. Tolbert.

Focuses upon the power and control exercised by professional groups in contemporary society. A number of issues are examined in this context, including the role of professions in society, processes through which an occupational group becomes defined as a profession, sources of control that professional associations have over their members, relations between professionals and nonprofessionals in organizations, and the relationship between unionization and professionalization of occupations.

**ILROB 429 Organizations, Politics and Institutional Change**

Spring. 2 credits. 7 weeks. Limited to juniors and seniors with permission of the instructor. Please see instructor before the first class. S. Bacharach.

Examines the market, cultural, political, and structural forces that change the organizational “rules of the game,” how these changes affect individuals and organizations, and the dynamics generated as individuals and organizations attempt to adjust to a new, unstable order. Issues to be examined include power, corruption, deal-making, rationality, uncertainty, and competition. Course requirements include completing a major research paper and leading a class discussion.

**ILROB 470 Group Processes**

Fall. 3 credits. Prerequisites: ILROB 170 and 171 or equivalent. Permission of instructor. 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, tactics of influence, solidarity and commitment, the management of emotion, the emergence and change of microcultures, and the role of groups in networks and organizations.

**ILROB 472 Applied Organizational Behavior**

Fall. 3 credits. Prerequisites: ILROB 170 and 171. S. Bacharach.

Introduces students to intermediate theory of organizational behavior. The course specifically concentrates on teaching students to use organization theories for analytical and applied purposes. Among the issues to be addressed are organizational structure, work processes, organizational politics, organizational design, job design, incentive systems, and quality-of-work-life programs.

**ILROB 495 Honors Program**

Fall and spring. 3 credits per term.

For description, see the section Collective Bargaining, Labor Law, and Labor History.

**ILROB 497-498 Internship**

Fall and spring. 3 and 6 credits.

For description, see the section Collective Bargaining, Labor Law, and Labor History.

**ILROB 499 Directed Studies**

Fall, spring. 3 credits. Staff.

For description, see the section Collective Bargaining, Labor Law, and Labor History.

**ILROB 520 Organizational Behavior and Analysis**

Fall or spring. 3 credits. Staff.

Survey of concepts, theories, and research from the fields of organizational and social psychology as these relate to the behavior of individuals and groups in organizations. Job attitudes, motivation, performance, leadership and power, prejudice, perception, and organizational climate. A preliminary course for advanced work in organizational behavior.

**ILROB 525 Organizational Behavior**

Fall, spring. 4 credits. Offered only for the New York City 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 622 Sociology of Markets (also SOC 622)**

3 credits. M. Lounsbury.

Since World War II, the diffusion of markets in Asia, Eastern Europe, and Latin America as well as changes in the structure of Western economies has reinvigorated questions about how markets are socially structured. Drawing on the literature in economic sociology, this course explores the social, cultural, economic, and political factors that shape the emergence and dynamics of markets. Among the issues addressed are the social organization of markets, market discrimination, the cooperative aspects of market formation and functioning, the role of government and other institutional arrangements, the relationship of economic change to broader social forces such as social movements, and the shift toward globally market-oriented economies.

**ILROB 624 Dynamics of the Social Sector**

Fall. 3 credits. M. Lounsbury.

Over the past couple of decades, the social sector has been undergoing a dramatic transformation. Standard solutions to social problems offered by public agencies and nonprofit organizations increasingly are being reconfigured by the entrance of new social enterprises that focus more on revenue generation than service provision. The emergence of this social entrepreneurship has been motivated by a combination of factors including the devolution of social services and related responsibilities from the federal government to state and local governments, as well as a general increase in financial pressures on public agencies and nonprofits. This course aims to provide students with a broad perspective on the historical evolution of the nonprofit sector, introduce students to the changing nature of the contemporary social sector, and explore the phenomenon of social entrepreneurship by examining a variety of new and creative ways in which social problems are being addressed.

**ILROB 625 Conflict, Power, and Negotiation**

Fall. 3 credits. Open to seniors and graduate students. Permission of instructor is required. Limited enrollment. E. Lawler.

Theoretical seminar adopts a power perspective on bargaining and conflict resolution. Examines how power relations and power processes affect tactics in bargaining and also when power relations inhibit or promote conflict resolution. "Power" is viewed in the course as a capability, embedded in a social structure, and tactics are the action based on or using such power. The seminar gives an overview of several theoretical approaches to conflict and bargaining (e.g., rational choice, cognitive, social exchange) and places the power perspective in this context.

**ILROB 626 Organizations and Social Inequality**

Fall and spring. 3 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 societal policy implications of each are considered.

**ILROB 627 Leadership in Organizations**

Spring. 3 credits. T. Hammer.

An examination of theories and research findings from the field of leadership that are relevant to leadership and the influence process in groups and organizations. Personality, situational factors, intergroup processes, interpersonal perception as well as the motivation to be both leader and follower are discussed. The implications for leadership training, organization development, and action research are explored.
ILROB 679 Methods of Observation and Analysis of Behavior
Fall or spring. 4 credits. Permission of instructor required. W. Sonnenstuhl. Focuses on methods and techniques. The course 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 case studies. 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. Because of the intensive nature of the course, class size is limited to 25 students.

ILROB 721 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. The course emphasizes reading and analysis of primary source material.

ILROB 722 Advanced Macro Organizational Behavior
Fall. 3 credits. Prerequisites: ILROB 520. Staff.
Examines the historical development of sociological theories of organizations and contemporary issues in macro organizational research. The course emphasizes reading and analysis of primary source material.

ILROB 725 Analysis of Published Research in Organizational Behavior (also SOC 725)
Fall. 3 credits. Prerequisites: ILROB 520 and 1 year of statistics. Staff.
An advanced research methods course that critically analyzes published research papers in the field of organizational behavior in terms of research design and method as well as theory.

ILROB 726 Selected Topics in Organizational Behavior
Fall. 3 credits. Prerequisites: ILROB 520 and permission of instructor.
An advanced 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 and distinctiveness of individual disciplines (e.g., anthropology, linguistics, philosophy, sociology) that may enrich our understanding of organizational life.

ILROB 728 Theories of Motivation and Leadership
Spring. 4 credits. Prerequisite: ILROB 520. T. Hammer.
Course provides an introduction to basic concepts of human motivation in general, with particular emphasis on the theories that explain and predict work motivation. Students examine the empirical research that tests the validity of the theories and shows how and under what conditions different motivation models can be used for practice in work organizations. Several current microtheories of leadership and power and related research are examined. The disciplinary perspective employed is social organizational psychology, and the level of analysis emphasized is action and experience of individuals in groups.

ILROB 729 Organizational Change and Intervention
Fall. 3 credits. Graduate students only. Staff.
This seminar is concerned with planned and unplanned change in organizations. It is designed to analyze theory in practice. Particular attention is paid to the role of internal and external change agents. Class members are encouraged to analyze contemporary changes such as mergers and acquisitions and workforce reductions. Participants submit weekly workforce journals.

ILROB 772 The Social Construction of Economic Life
Spring. 3 credits. M. Louisboury.
Drawing on the literature in economic sociology, this course emphasizes how economic activities are constituted and shaped by the social, cultural, and historical contexts in which they are situated. This course surveys various empirical and theoretical approaches used to study the genesis and influence of broader-scaled organizational and institutional arrangements. The course provides students with an opportunity to formulate and refine their own research questions and perspectives.

ILROB 776 Globalization and Its Discontents: The Organizational Implications of Global Competition
Fall. 4 credits. Staff.
Aimed at helping students develop an understanding of organizations as complex social systems, and at helping them understand the behavioral implications of new manufacturing initiatives. Case studies are used to study the introduction of a variety of innovations in contemporary manufacturing, including manufacturing cells and teams, concurrent engineering, total quality management, and just-in-time material flow. Analyses emphasize the impact of such innovations on individuals’ role definitions and organizations’ communication requirements and patterns, group dynamics, leadership behaviors, labor relations, and human resource management systems. ILROB 776 is a core course in the Master of Engineering/Mfg./Manufacturing Option degree program.

ILROB 778 Solidarity in Groups (also SOC 778)
Fall. 3 credits. E. Lawler.
Examines sociological and social psychological theories about how social solidarity or a “sense of community” comes about and is maintained in groups and organizations. Distinguishes emotional, normative, and instrumental bases for social solidarity and shows how these promote or inhibit subgroup formation in organizations, commitment of individuals to organizations, and organizational citizenship behavior.

ILROB 790 ILR M.P.S. Program
Fall and spring. 1-9 credits.
Supervised research only for those enrolled in the ILR M.P.S. program.

ILROB 798 Internship
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILROB 799 Directed Studies
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILROB 820 Organizational Behavior Workshop
Fall. 2 credits. Limited to M.S. and Ph.D. candidates in the department. S-U grades only. Staff.
This workshop is designed to provide a forum for the presentation of current research undertaken by faculty members and graduate students in the Department of Organizational Behavior and by invited guests. All M.S. and Ph.D. candidates in the department who are at work on their theses are strongly urged to enroll. Each student in the course is expected to make at least one presentation during the year, focusing on the formulation, design, execution, and results of that student’s thesis research.

SOCIAL STATISTICS

T. DiCiccio, chair; J. Angellotti, J. Bunje, D. Fink, P. Velleman, M. Wells

ILRST 210 Statistical Reasoning I
Fall, spring, and summer 2004–2005. 3 credits. Attendance at weekly discussion section is required. P. Velleman.
An introduction to the basic concepts of statistics and data analysis. Descriptive methods, normal theory models, and inference procedures for univariate and bivariate data. Basic statistical designs, an introduction to probability, and applications of the Binomial and Normal distributions are covered. Estimation, confidence intervals, and tests of significance for a single population mean and proportion, the difference in two population means and proportions, simple linear regression, correlation, and two-way contingency tables are also considered. Students are instructed on the use of a statistics computer package at the beginning of the term and use it for weekly assignments.

ILRST 211 Statistical Reasoning II
Fall, spring, and summer 2004–2005. 3 credits. Prerequisite: ILRST 210 or suitable introductory statistics course. J. Angellotti.
A second course in statistics. Applications of statistical data analysis techniques, particularly to the social sciences. Topics include statistical inference, simple linear regression, multiple linear regression, logistic regression, and analysis of variance. Computer packages are used throughout the course.

ILRST 310 Statistical Sampling
Fall. 3 credits. Prerequisite: 2 terms of statistics. S. Schwager.
Theory and application of statistical sampling, especially in regard to sample design, cost, estimation of population quantities, and error estimation. Assessment of nonsampling errors. Discussion of applications to social and biological sciences and to business problems. Course includes an applied project.

ILRST 311 Practical Matrix Algebra
Fall or spring. 3 credits. Staff.
Matrix algebra is a necessary tool 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 511 Statistical Methods for the Social Sciences II
Fall, spring, and summer 2004–2005. 3 credits. Prerequisite: ILRST 510 or equivalent introductory statistics course. D. Fink.

A 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 515 Statistical Research Methods
Fall or spring. 4 credits. Offered only for the New York City M.P.S. Program. Staff.

Provides a comprehensive introduction to the general structural equation system, commonly known as the "LISREL model." One purpose of the course is to demonstrate the generality of this model. Rather than treating path analysis, recursive and nonrecursive models, classical econometrics, and confirmatory factor analysis as distinct and unique, this course treats them as special cases of a common model. Another goal of the course is to emphasize the application of these techniques.

ILRST 516 Structural Equations with Latent Variables
Fall. 3 credits. Prerequisites: ILRST 210, 211 or ILRST 510, 511, or equivalent. Not offered 2004–2005. M. Wells.

Provides a comprehensive introduction to the general structural equation system, commonly known as the "LISREL model." One purpose of the course is to demonstrate the generality of this model. Rather than treating path analysis, recursive and nonrecursive models, classical econometrics, and confirmatory factor analysis as distinct and unique, this course treats them as special cases of a common model. Another goal of the course is to emphasize the application of these techniques.

ILRST 517 Likelihood Inference
Fall. 3 credits. Prerequisites: graduate courses equivalent to ORIE 670 and ORIE 670. 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 799 Directed Studies
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILR EXTENSION

ILRST 510 Statistical Methods for the Social Sciences I
Fall, spring, and summer 2004–2005. 3 credits. J. Angelotti.

A first course in statistics for graduate students in the social sciences. Descriptive statistics, probability and sampling distributions, estimation, hypothesis testing, simple linear regression, and correlation are all covered. Students are instructed on the use of a statistics computer package at the beginning of the term and use it for weekly assignments.

ILRST 512 Applied Regression Methods
Fall. 3 credits. Prerequisite: ILRST 211 or equivalent courses. T. DiCiccio.

Matrix algebra necessary to analyze regression models is reviewed. Multiple linear regression, analysis of variance, nonlinear regression, and linear logistic regression models are covered. For these models, least squares and maximum likelihood estimation, hypothesis testing, model selection, and diagnostic procedures are considered. Illustrative examples are taken from the social sciences. Computer packages are used.

ILRST 510 Statistical Methods for the Social Sciences I
Fall, spring, and summer 2004–2005. 3 credits. J. Angelotti.

A first course in statistics for graduate students in the social sciences. Descriptive statistics, 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 512 Applied Regression Methods
Fall. 3 credits. Prerequisite: ILRST 211 or equivalent courses. T. DiCiccio.

Matrix algebra necessary to analyze regression models is reviewed. Multiple linear regression, analysis of variance, nonlinear regression, and linear logistic regression models are covered. For these models, least squares and maximum likelihood estimation, hypothesis testing, model selection, and diagnostic procedures are considered. Illustrative examples are taken from the social sciences. Computer packages are used.
240 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.

241 Arbitration
Fall or spring. 3 credits. Staff. A 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.

242 Public Sector Collective Bargaining
Fall or spring. 3 credits. Staff. An introduction to collective bargaining in the public sector. Examines 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.

245 Public Sector Labor Law
Fall or spring. 3 credits. Staff. A survey and analysis of the New York State Public Employees Fair Employment Act is made as well as a comparison with other state laws covering public employees. The course examines the extent 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.

247 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.

248 Employment Practices Law
Fall or spring. 3 credits. Staff. Considers laws and regulations that directly affect managers and employers. Students examine such laws 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.

250 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.

251 Principles and Practices of Management
Fall or spring. 3 credits. Staff. Presents the theory and processes of management with an emphasis on supervision. Management functions of planning, organizing, and evaluating are included. Concepts and theories are presented, and case studies are analyzed. Motivating people, exercising leadership, and effectively developing employees are emphasized.

252 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.

253 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.

254 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 given to the impact of labor law on workers, unions, and employers.

255 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. Included is a discussion of the development of trade union organizations 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.

256 Dispute Resolution
Fall or spring. 3 credits. Staff. Examines third-party participation in dispute resolution in private and public sector collective bargaining. Development of 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 looked at.

259 Union Administration
Fall or spring. 3 credits. Staff. Focus is 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.

264 Contemporary Labor Problems
Fall or spring. 3 credits. Staff. A 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.

367 Safety and Health in the Workplace
Fall or spring. 3 credits. Staff. Provides basic education and training in workplace safety and health. The course focuses on applicable federal and state laws, standards for safety and health, industrial hygiene, and such health concerns as asbestos, radon, and AIDS. Practical experience is provided through workplace walk-through safety and health inspections and in use of industrial hygiene equipment to measure noise, temperature, humidity, airflow, and airborne toxins.

FACULTY ROSTER
Abold, John M., Ph.D., U. of Chicago. Edmund Ezra Day Prof. of Industrial and Labor Relations, Labor Economics
Angellotti, Jon E., M.S. candidate, Cornell U. Lecturer, Social Statistics
Applegate, Ronald, Ph.D., SUNY Binghamton. Lecturer, Collective Bargaining, Labor Law, and Labor History
Bacharach, Samuel, Ph.D., U. of Wisconsin. Jean McKelvey-Alice Grant Prof. of Labor Management Relations, Organizational Behavior
Bell, Bradford, Ph.D., Michigan State U. Asst. Prof. Human Resource Studies
<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Position / Specialization</th>
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<tbody>
<tr>
<td>Blau, Francine D., Ph.D.,</td>
<td>Harvard U. Francis Perkins Prof. of Industrial and Labor Relations.</td>
<td>Labor Economics</td>
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<tr>
<td>Boyer, George R., Ph.D.,</td>
<td>U. of Wisconsin.</td>
<td>Prof., Labor Economics</td>
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<td>Bunge, John A., Ph.D.,</td>
<td>Ohio State U. Assoc. Prof., Social Statistics</td>
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<td>Collins, Christopher, Ph.D.,</td>
<td>U. of Maryland.</td>
<td>Asst. Prof., Human Resource Studies</td>
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<td>Compa, Lance, J.D., Yale Law School Sr. Lecturer, Collective Bargaining, Labor Law, and Labor History</td>
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<td>Cook, Maria L., Ph.D.,</td>
<td>Univ. of Calif., Berkeley. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History</td>
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<tr>
<td>Ehrenberg, Ronald, Ph.D.,</td>
<td>Northwestern U. Irving M. Ives Professor of Industrial and Labor Relations and Economics, Labor Economics</td>
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<td>Fields, Gary S., Ph.D.,</td>
<td>U. of Michigan.</td>
<td>Prof., Labor Economics, and International and Comparative Labor</td>
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<td>Haas, Martine, Ph.D.,</td>
<td>Harvard Business School. Asst. Prof., Organizational Behavior</td>
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<td>Hammer, Tove H., Ph.D.,</td>
<td>U. of Maryland.</td>
<td>Prof., Organizational Behavior</td>
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<td>Hommghouse, Christina, B.S.,</td>
<td>Ithaca College.</td>
<td>Lecturer, Human Resource Studies</td>
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<td>Hurd, Richard W., Ph.D.,</td>
<td>Vanderbilt U. Prof., Extension and Public Service</td>
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<td>Jakobson, George H., Ph.D.,</td>
<td>U. of Wisconsin.</td>
<td>Assoc. Prof., Labor Economics</td>
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<td>Katz, Harry C., Ph.D.,</td>
<td>U. of California at Berkeley. Jack Sheinkman Prof. in Collective Bargaining, Labor Law, and Labor History</td>
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<td>Kuruvilla, Sarosh C., Ph.D.,</td>
<td>U. of Iowa.</td>
<td>Prof., Collective Bargaining, Labor Law, and Labor History</td>
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<td>Lawler, Edward J., Ph.D.,</td>
<td>U. of Wisconsin at Madison. Prof., Organizational Behavior</td>
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<td>Lipsky, David B., Ph.D.,</td>
<td>Mass. Inst. of Technology. Prof., Collective Bargaining, Labor Law, and Labor History</td>
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<td>Lounsberry, Michael, Ph.D.,</td>
<td>Northwestern U.</td>
<td>Asst. Prof., Organizational Behavior</td>
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<td>Salvenatore, Nicholas, Ph.D.,</td>
<td>U. of California at Berkeley. Prof., Collective Bargaining, Labor Law, and Labor History</td>
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<td>Seeber, Ronald L., Ph.D.,</td>
<td>U. of Illinois.</td>
<td>Assoc. Prof., Extension</td>
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<td>Smith, Robert S., Ph.D.,</td>
<td>Stanford U. Prof., Labor Economics</td>
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<td>Snell, Scott, Ph.D.,</td>
<td>Michigan State U. Prof., Human Resource Studies</td>
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<td>Sonnenstuhl, William J., Ph.D., New York U. Assoc. Prof., Extension and Organizational Behavior</td>
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<td>Stone, Katherine J.D.,</td>
<td>Harvard U. Anne Evans Estabrook Prof. in Dispute Resolution, Collective Bargaining, Labor Law and Labor History</td>
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<td>Tolbert, Pamela S., Ph.D.,</td>
<td>U. of California.</td>
<td>Prof., Organizational Behavior</td>
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<td>Velleman, Paul F., Ph.D.,</td>
<td>Princeton U. Assoc. Prof., Social Statistics</td>
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<td>Vidyashankar, Anand, Ph.D.,</td>
<td>Iowa State U. Assoc. Prof., Statistical Science and Social Statistics</td>
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<tr>
<td>Wells, Martin T., Ph.D.,</td>
<td>U. of California at Santa Barbara. Prof., Social Statistics</td>
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<td>Wright, Patrick M., Ph.D.,</td>
<td>Michigan State U. Prof., Human Resource Studies</td>
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 JOHNSON GRADUATE SCHOOL OF MANAGEMENT

ADMINISTRATION
Robert J. Swierenga, dean
L. Joseph Thomas, associate dean for academic affairs
Cathy S. Dove, associate dean for MBA Program and administration
Richard A. Shafer, associate dean for corporate relations
Thomas B. Hambury, director of executive programs
Rosemary A. Hines, executive director of development and alumni development
Natalie M. Grinblatt, director of admissions
Karim S. Ash, director of career services
Rhonda H. Velazquez, director of student activities and special events
Ann W. Richards, financial aid director and associate director of admissions
Janet S. Gray, registrar and associate director for MBA Program

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 will 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, Room 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/currentstudents/ for information on enrollment and a complete course roster.

UNDERGRADUATE ONLY

NBA 300 Entrepreneurship and Enterprise
Fall, spring. 3 credits. D. BenDaniel. The course uses Cornell-developed case studies and lectures to address entrepreneurial management in start-up ventures and new-business development in existing companies. Among the topics covered are 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 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. For non-Johnson School students only. Johnson School students see NBA 564.

NBA 471 Cornell Management Simulation
Fall. 3 credits. S. Smith.
This course provides experience in managing a company and an investment portfolio in a realistic business environment. After initial training, small teams of students make periodic marketing, production, and finance decisions for one of five firms in the same industry (meeting at their convenience). At the beginning of the simulation, each team writes a strategic intent paper. Before the last decision is made, each team presents its analysis of its performance and strategy at a "board of directors" (BOD) meeting. The management component of the grade is based primarily on the stock market performance of the team's firm (relative to others in the industry). The team's strategic intent paper, its performance at the BOD meeting, and the contribution of team members are also considered. Each student actively manages stock portfolios of companies in two investment performances compared with performances of passive benchmark portfolios in the same industries. Prior courses in accounting, finance, and marketing are highly recommended.

COURSES FOR NON-JOHNSON SCHOOL STUDENTS

NBA 507 Entrepreneurship for Scientists and Engineers
Fall, spring. 3 credits. J. Nesheim, 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 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. Designed for M.Eng. students, the course is also open to Ph.D. and M.S. students, and seniors have preference as undergraduates.

NBA 553 Accounting and Financial Analysis for Engineers
Spring. 3 credits. Course intended for non-Johnson School students only. J. D'Souza. This course focuses on basic financial and managerial accounting and the economic and financial concepts that have a bearing on managerial decisions. The goals of the course are: 1) to give students a working knowledge of the accounting process and the value and limitations of the data that comes out of the accounting information system; 2) to familiarize students with key concepts in managerial accounting and the application of cost information to pricing and operating decisions; 3) and to 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 550 Financial Accounting
Fall, spring. 3 credits. Course intended for non-Johnson School students only. Staff. An 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. This course is similar in content to the MBA core course NCC 500.

NCC 553 Marketing Management
Fall, spring. 3 credits. Course intended for non-Johnson School students only. Staff. The course addresses controllable and uncontrollable marketing variables that managers in multi-product firms face in today's business environment. Topics include customer behavior, product planning, distribution, advertising and promotion, pricing, and competitive strategy. This course is similar in content to the MBA core course NCC 503.

NCC 554 Management and Organizations
Fall, spring. 3 credits. Course intended for non-Johnson School students only. Staff. This course takes a resource-based approach to management by arguing that organizations should link their strategy to their internal resources and capabilities. This theme is developed 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. Included among the topics are: how firms create sustainable competitive advantage through internal resources and capabilities; what the best practices are for managing people; what effects best practices have 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. This course is similar in content to the MBA core course NCC 504.

NCC 556 Managerial Finance
Fall, spring. 3 credits. Course intended for non-Johnson School students only. Staff. An introduction to business finance through theory and case studies. Topics include stock and bond valuation, the capital-budgeting decision, portfolio theory, the asset-pricing models, raising capital, capital structure, mergers and acquisitions, costs of capital, option pricing, and risk management. International applications are considered within each topic area. Letter grade only, based on exam, group case reports, homework and class participation. This course is similar in content to the MBA core course NCC 506.

IMMERSIONS
Only at the Johnson School will you find learning immersion courses in manufacturing, 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
This is a unique immersion course specifically designed for students planning to pursue finance careers. Some students interested in non-finance 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 of this course is to help students make more informed choices about how to launch their finance careers. Prerequisite: NCC 506 with a grade of B or better.

NBA 500 Managerial Cost Accounting
This is a full-time program for the semester; students cannot 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 will provide 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 will also be 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 will be considerable off-campus travel for field study. Prerequisites: NCC 500, 501, 502, 503, and 506. Restricted enrollment—permission of the instructor required.

NBA 502 Managerial Cost Accounting
This is a 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.
Johnson School students should complete NCC 501 and NCC 506 before taking this course. Enrollment limited, permission of instructor required.

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>NBA 502</td>
<td>Cost Accounting</td>
<td>2.5</td>
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<tr>
<td>NBA 650</td>
<td>Semester In Manufacturing Practicum</td>
<td>7.5</td>
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<tr>
<td>NCC 508</td>
<td>Managing Operations</td>
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<td>NCC 509</td>
<td>Strategy</td>
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**NCC COMMON CORE COURSES**

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<tr>
<td>NCC 500</td>
<td>Financial Accounting</td>
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<td>NCC 501</td>
<td>Statistics for Management</td>
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<td>NCC 502</td>
<td>Microeconomics for Management</td>
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<tr>
<td>NCC 503</td>
<td>Marketing Management</td>
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**JOHNSON GRADUATE SCHOOL OF MANAGEMENT • 2004–2005**
NBA 502 Managerial Cost Accounting  
Fall, spring. 3 credits. Prerequisites: NCC 500, NCC 501, and NCC 502, or the equivalent. R. Hilton, R. Bloomfield.  
The course is designed both for those responsible for internal accounting information and those who use such information for decision making. Topics include budgeting, cost accumulation and product costing, activity-based costing, standard costs, the analysis of cost variances, cost estimation and prediction, cost-price-volume decisions, performance measurement, nonmanufacturing cost analysis, cost allocation, and transfer pricing. Instruction will be a mixture of lecture and case discussion. Student evaluation will be based on a midterm exam, a final exam, a project, and class participation.

NBA 503 Strategic Cost Management  
1.5 credits. R. Hilton.  
This course focuses on the role of cost management and related issues in helping a firm compete successfully in the global market. Topics considered include activity-based costing, activity-based management, value chain analysis, the lean enterprise, continuous improvement, time-based competition, cost versus quality, and benchmarking. The course is almost entirely based on cases, many of them lean enterprises in Japan.

NBA 506 Financial Statement Analysis  
Spring. 1.5 credits. Prerequisite: NCC 506, NBA 506 (or concurrent enrollment), or permission of the instructor. S. Bhorjraj, P. Hribar.  
This course develops a set of core skills essential to financial statement analysis. We will cover 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. Emphasis is on 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 will be an exam.

Note: Students who have completed the three-credit version of NBA 506 cannot enroll in this course.

NBA 509 Advanced Financial Analysis  
Fall. 1.5 credits. Prerequisites: NBA 506, MBA 500, or the equivalent. S. Bhorjraj, P. Hribar.  
This course builds on the core financial analysis skills developed in NBA 506. Topics covered include equity valuation, residual income models, quality of earnings assessments, earnings manipulation detection, market efficiency issues, fairness opinions in MBO’s, 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 analytical and communication skills. The course features both lectures and cases. There will be a group term project, but no final exam.

NBA 511 Financial Modeling  
Fall, spring. 1.5 credits. Prerequisites: MBA 506 or permission of the instructor, and mastery of basic Excel skills. P. Hribar.  
Financial modeling is the art and science of constructing spreadsheet models of firms’ future financial statements. This class builds on the brief introduction to financial modeling in NBA 506 by modeling the effect on the income statement, balance sheet, and statement of cash flows of more complicated financial transactions such as leveraged buyouts, mergers and acquisitions, and corporate reorganizations. The class meets in the state-of-the-art Parker Center computer lab, and active student participation is emphasized.

NBA 512 Applied Portfolio Management  
Fall, spring. 3 credits. Restricted. B. Swaminathan.  
An accounting/finance elective course that focuses on the management of an investment fund (see Charles Lee for a full course description). Students enrolled in this course must commit to taking the course for fall and spring semesters. They receive three credit hours for each semester’s work. Strong preference is given to second year MBA students who have successfully completed either NBA 506 or one of the finance immersions. Students need to apply formally. If the number of applicants exceeds 12, admission is competitive and merit-based.

NBA 520 Advanced Financial Analysis  
Fall. 3 credits. Prerequisite: NBA 506 or equivalent. I. Aziz.  
The course applies basic macroeconomic theory to such problems as inflation, unemployment, economic growth, and productivity and examines how these problems interact with international trade and finance. Students learn to be informed observers of national and international economic policy and are often the users of economic analyses and forecasts. A lecture/discussion format is used as the method of instruction.

NBA 522 Applied Price Theory  
Spring. 4 credits. R. Frank.  
This course will emphasize how economic analysis can help firms and individuals make the most of their opportunities. Of special interest to managers and consultants will be the course’s focus on examples that illustrate how faulty economic reasoning leads to inefficient outcomes. The course will also emphasize strategic thinking that will instruct 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 519 Sustainable Business—The Challenge of the 21st Century  
Fall. 1 credit. B. Sull.  
This one-credit, eight-session course gives students an overview of the emerging sustainable business model. By examining current writings and comparing them to the actual experiences of the lecturer’s own business, students will draw conclusions about how this business model could be employed in their individual career paths.

Students will learn that, in addition to traditional financial analysis, these decisions can benefit from considering the impacts of social and ecological capital. This so-called “triple bottom line” of sustainable business is so new that most information on the subject has been generated in the past four years. Students will read about actual cases and the logic of how this model has been constructed. There will be dialogue about the advantages as well as the barriers and challenges of applying sustainable principles.

NBA 521 Investing in Distressed Corporations  
Fall. 1 credit. J. Rubin, R. Symington, J. Hass.  
This course focuses on the burgeoning practice of investing in distressed companies. Once a backwater, this $600 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 continued 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 will encounter distressed situations in their careers. Using a “bottom 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 destruction through reorganizations/liquidations and new/old money plans are explored. These principles are then applied to real-world situations using case studies.

NBA 525 Social Entrepreneurship  
Spring. 1 credit. M. Lounsby.  
Social entrepreneurship involves blending nonprofit and for-profit goals to address problems in the social sector in novel ways. The emergence of social entrepreneurship has been motivated by factors including the devolution of social services and related responsibilities from the federal government to state and local governments, as well as a general increase in financial pressures on public agencies and nonprofits. Once perceived as part of the problem, business is increasingly embraced for its dynamism, market discipline, focus on efficiency, and as a source of innovation to reinvent how socially important goods and services are organized and delivered. This course aims to introduce students to social entrepreneurship by examining a variety of ways in which social problems are being addressed in new and creative ways. To encourage practical application, students will be expected to participate actively in real-world case discussions.

NBA 530 Entrepreneurship Lab  
Fall, spring. 3 credits. Prerequisites: NBA 564 Entrepreneurship, or concurrent enrollment, or permission of the instructor. MBA students only. G. Schneider.  
Students team up with entrepreneurs in the greater Ithaca area on defined projects, which will be integral to the companies’ operations, such as production planning, new product launches, or assessing organizational structure.
The goal of the course is for students to gain first-hand exposure to the application of functional knowledge in a start-up setting, while bringing real value to the host company.

NBA 531 Venture Start-up
Fall, spring. 1 credit. R. Ryan.
This is a short course of eight lectures over two weeks by Prof. Rob Ryan, founder of Ascend Communications and of Entrepreneur America, a boot camp for start-ups. The course uses Michael M. Smarr's Venture Start-up: The New Entrepreneur's Guide. The lectures contain analyses of various styles of entrepreneurship, ways of determining the viability of technical businesses and hints for negotiation with venture capital sources, among other important topics.

NBA 535 Special Readings in Private Equity
Spring. 0.5 credit. D. BenDaniel.
This course will meet four times during the semester. The subject will be the transformation of a public corporation to private equity. The advantages and disadvantages of private equity will be discussed, but the focus will be on financial models. These models show the economic advantages of private equity as well as how to achieve that status.

NBA 557 Case Studies in Venture Investment and Management
Fall, Spring. 1 credit. B. Erofeev, Y. Hochberg.
This course 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. Presentation of cases by venture capitalists and entrepreneurs will supplement student discussion and analysis of cases. Grades will be based on written reports, quality of classroom participation, and a final exam.

NBA 559 The Venture Capital Industry and Private Equity Markets
Spring. 0.5 credit. D. BenDaniel.
This course 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 larger funds and the critical role of a new class of gatekeeper/consultants for limited partners. The course involves four lectures and a final paper.

NBA 563 The IPO Process and Deal Structure Alteratives
Spring. 3 credits. Z. Shulman.
Students will be given an in-depth look at initial public offerings and deal structures from a practitioner's point of view. With respect to initial public offerings, the course covers the applicable statutory framework, pre-offering corporate preparations (such as the implementation of poison pills and stock option plans), 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 transfer agent (SSTE, NASDAQ or AMEX). Regarding deal structures, the course explores choosing an appropriate transaction structure (i.e., stock versus asset sale, merger, etc.), deal financing alternatives, due diligence processes, transactional issues (i.e., anti-takeover matters and directors' fiduciary duty concerns), and crucial legal aspects of the acquisition, such as caps/collars, letters of intent, successor liability, continuity of employees, and noncompete agreements.

NBA 564 Entrepreneurship and Private Equities
Fall, spring. 3 credits. D. BenDaniel.
The course uses Cornell-developed case studies and lectures to address entrepreneurial management in start-up ventures and new business development in existing companies. Among the topics covered are 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 653 Strategic Alliances
Spring. 1 credit. J. Swinska.
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 of the course 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 678 Lectures on the Venture Capital Industry
Spring. 1.5 credits. Prerequisites: NBA 564, NBA 300, NBA 401 or permission of instructor. J. Bartlett, D. BenDaniel.
This course will focus 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. The emphasis is on practical skills: hands-on examination, for example, of how deals are negotiated and valuations arrived at, our principal focus being the so-called Series A, or first professional, round of financing. We will view the early stage space from three points of view: 1) the entrepreneur, or founder, 2) the professionals investors, or VCs or key executives, i.e., the major players in emerging growth finance. We will review economics, finance, tax, securities, corporate and employment law considerations, and custom and usage in the industry. This is an Internet course with one classroom lecture by Prof. Bartlett.

NBA 689 Law for High-Growth Business
Spring. 1.5 credits. Z. Shulman.
An in-depth analysis of how legal 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 (common stock, preferred stock, warrants, etc.), 5) use of stock options as employee incentives, 6) fundamental unfair employment practices, 7) proper establishment and use of boards of 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 529 Securities Analysis
Spring. 1.5 credits.

NBA 539 Essentials of Corporate Finance
Fall. 1.5 credits. H. Bierman.
This course is designed for students who want to understand the essential elements of corporate finance while at the same time it lays the foundation for those who want to follow a career in corporate finance. Among the topics covered are preferred stock (PERCS) and (MIPS), cost of common stock equity, convertible debt, capital structure, the use of debt to add value, distribution policy, mergers and acquisitions, corporate restructuring, and private equity.

NBA 540 Advanced Corporate Finance
Fall. 1.5 credits. Prerequisite: NBA 539. H. Bierman.
This course is relevant for both investment banking and the treasurer's activities of an operating corporation. Most class sessions are lecture-discussion, but there may be several corporate finance cases. The topics include debt securities (duration, convexity, inverse floaters, bond refunding, term structure) interest rate and other types of swaps, exotic new securities, financial strategies, and the buy versus lease decision. We will investigate corporate financial policy decisions from a normative-quantitative point of view and develop skill in formulating financial models and evaluating models. The mathematics used is basic. The goal is to develop an approach to analyzing corporations' financing decisions.

NBA 542 Investment and Portfolio Management
Fall, spring. 3 credits. Prerequisites: NCC 501, 502, and 506, comfort with quantitative methods. H. Li.
This course deals with several important issues pertaining to investment in corporate securities. First it deals with portfolio diversification theory, asset allocation, asset pricing models (e.g. CAPM and APT) and empirical anomalies such as size effect, January effect, and others. Second, the course deals with the issue of evaluating portfolio performance and mutual fund performance. Third, it deals with investment strategies based on patterns in historical security returns. This may be loosely considered technical analysis. In addition, the course deals with investment strategies based on publicly available information related to accounting and other market statistics and the use of earnings forecasts. This may be considered as falling under fundamental
This is a highly quantitative course involving 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 543 Financial Markets and Institutions**
Fall, Spring, 3 credits. Prerequisite: NCC 506 (Finance core). M. O’Hara.
This course applies principles of finance in order to understand modern financial markets. Central themes are the structure of financial markets, their pricing function, the interaction between financial markets and macroeconomic conditions, and the processes of innovation and regulation in these markets. Students look at the workings of a variety of markets and develop an understanding of the different problems which different types of markets address, the role of market efficiency and the interaction between government policies and financial markets is studied. We analyze issues in innovation and regulation with basic principles of financial economics. Throughout the course, the relevance of these issues for the practical corporate, portfolio, or public sector decision maker is considered. The course includes ideas and evidence from academic research along with historical, institutional, and international perspectives. Recent events are used to illustrate concepts and develop analytic skills. Spreadsheet assignments and a term project requiring data analysis develop research skills and illustrate academic concepts. Exams consist of computational, short answer, and short essay questions.

**NBA 551 Current Topics at the Crossroads of Law and Finance (also LAW 627)**
Spring, 3 credits. M. O’Hara, J. Macy.
This course explores a series of selected topics that illustrate important issues in law and finance. The premise of the course is that financial institutions of all kinds, whether they are known as insurance companies, banks, investment banks, or pension funds, invest money and advise clients in a wide variety of settings. This agency relationship introduces a number of important dimensions to the intermediary-client relationship. This course looks at these issues from both an economic and legal perspective. Emphasis is placed on the intersections between modern finance theory and legal analysis.

**NBA 552 Cases in Corporate Finance**
Spring, 3 credits. Prerequisites: NCC 506 or the equivalent. Recommended: NBA 540. Course is limited to second-year MBA’s and Twelve-Month Option (TMO) students. Students who took NBA 535 and/or NBA 536, 1.5 credit version, cannot enroll in this course. H. Bierman.
This course consists of discussions of corporate finance cases. Students form groups and formally present one case and critique a second. This is in addition to the normal class sessions. The cases in this course deal with mergers, acquisitions, valuation, corporate restructuring, LBO’s, merchant banking, and the financing of corporations. The material applies equally to careers in investment banking and managerial finance. The course does not deal with sales trading or the details of managing an investment banking firm. Several executives working in corporate finance will present cases.

**NBA 554 International Finance**
Spring, 3 credits. Prerequisite: NCC 506 (Finance core) or permission of instructor. W. Bailey.
This course applies principles of finance to the international setting. Financial market structures are examined to determine how financial decisions create, destroy, or modify value.

**NBA 555 Fixed Income Securities and Interest Rate Options**
Fall, 3 credits. Prerequisites: NCC 506 (Finance core), NCC 501 (Quantitative Methods core). R. Jarro.
This course is designed to study the pricing, hedging, and risk management of fixed income securities and interest rate derivatives. The course will include the following topics: 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, with computer illustrations being an integral part of the class content.

**NBA 556 Corporate Financial Policy**
Spring, 1.5 credits. Prerequisite: NCC 506 (Finance core). Y. Grinstein.
The purpose of this course is to provide an understanding of the financial decisions that corporations make. We will discuss the factors that affect corporate financial decisions and how they determine firms’ financing, investment, and hedging policies. These factors include taxes, transaction costs, contracting (between managers and shareholders and between shareholders and other claimholders such as bondholders), and asymmetric information. Much of the material will be presented using examples and cases designed to demonstrate how financial decisions create, destroy, or modify value.

**NBA 565 Corporate Governance**
Spring, 1.5 credits. Prerequisites: NCC 506 and NBA 565 or permission of instructor. Y. Grinstein.
This course deals with the ways in which different institutions 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. In this course we will explore these issues through a series of case studies and examples. We will start with the venture capital (VC) process and discuss the ways in which venture capitalists manage the role of stage financing in mitigating VC losses and its effect on project valuation will be explored. We will then examine different governance mechanisms in more established firms. In particular, we will discuss the board of directors, merger and acquisition market, institutional investors, compensation contracts, debt contracts, and bankruptcy proceedings. Relevant theory will accompany the cases. Topics covered depend on time availability. Career focus: M.B.A. students aspiring to top corporate offices, regardless of functional area, or envisioning a career in M&A/Investment banking, financial management, or consulting firms.

**NBA 565 Advanced Valuations**
Spring, 1.5 credits. Prerequisites: Must have taken the IB Immersion or permission and signature of professor. B. Swaminathan.
The advanced valuation course builds on the valuation principles course. It applies discounted cash flow valuation (DCF) and valuation by multiples using comparables to multinational contexts. We consider mergers and acquisitions, and multinational project and firm valuations, from the viewpoint of a U.S. manager. Issues such as differences in parent and project cash flows, accounting differences, exchange risks, political risks, and valuation in developing countries are discussed. Then, we examine the contingent claims valuation approach, with emphasis on flexibility in managerial decision-making. We focus on the valuation of strategic options, growth options, and flexibility in capital investments using traditional and non-traditional option pricing techniques. Valuation of growth options, expansion options, corporate finance, reorganization, R&D, young-high growth companies, etc., using the Black-Scholes option pricing model and its variants are discussed. Grading is based on cases, a valuation project involving a foreign company, and a final exam.

**NBA 566 Valuations Principles**
Spring, 1.5 credits. D. Weinbaum.
The course 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) and valuation by multiples using comparables. We focus on the valuation of strategic options, growth options, and flexibility in capital investments using traditional and non-traditional option pricing techniques. Valuation of growth options, expansion options, corporate finance, restructuring, R&D, young-high growth companies, etc., using the Black-Scholes option pricing model and its variants are discussed. Grading is based on cases, a valuation project involving a foreign company, and a final exam.
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divisional cost of capital, etc. We apply these concepts to computing cost of capital. Finally, we introduce valuation by multiples using comparables and discuss its applications to valuing divisions of multi-business firms.

NBA 673 Introduction to Derivatives, Part 1
Fall, spring. 1.5 credits. Prerequisite: NCC 506 (finance core) or permission of the instructor. H. Li, X. Zhang.
The course introduces students to the pricing and hedging of derivative securities. The course briefly covers forward contracts, futures contracts and swaps. The primary emphasis is on option contracts. Underlying assets include stocks, currencies, and commodities.

NBA 674 Introduction to Derivatives, Part 2
Fall, spring. 1.5 credits. Prerequisite: NCC 506 (finance core) or permission of the instructor. H. Li, X. Zhang.
See above, NBA 673.

General Management

NBA 537 Information in Markets
Spring. 1.5 credits. R. Bloomfield.
This course uses simulations of financial markets to give students first-hand experience of how markets process information, how different types of market participants exploit informational advantages (or protect themselves against informational disadvantages) in different types of markets, and how disclosure regulations affect market behavior and trader wealth.

NBA 538 Inclusive Leadership
Spring. 1.5 credits. P. Stepp.
This course prepares students for leadership in diverse organizations of today and the future. Discussions and readings about accountability, fairness, stereotyping, mentoring, networking, and the impact of challenging assignments are used to help students become aware of ways they may discriminate against, judge, or exclude people, and to help students initiate and develop relationships with people who are different from themselves. Case studies, group activities, a diversity awareness profile, and written assignments that require students to critically reflect on situations where they felt excluded are the primary teaching methods used in the course.

NBA 544 Labor Economics for Managers
Spring. 1.5 credits. G. Fields.
This is a course in labor market economics for prospective managers in the corporate and nonprofit sectors. The course begins with demand and supply in labor markets, presenting the tools of decision analysis for workers and firms. It then considers various topics for managers, including hiring the right quantity and types of workers; identifying, attracting, and retaining talent; individual labor supply decisions; and strategic budget constraints.

NBA 550 Risk Management
Fall. 1.5 credits. R. Jarrow.
This course studies advanced topics in derivatives and risk management. The first part of the course covers topics in derivatives and develops the tools necessary for analysis, and the second part covers their application to risk management.

NBA 560 Business Law I (also AEM 320)
Fall. 3 credits. Limited to juniors, seniors, and graduate students. D. Grossman.
The course introduces the basic concepts of law as they apply to businesses and their operations. Topics include personal property, contracts, agency, real property, and landlord-tenant concerns. Text readings and case studies are used. All students intending to be professional accountants are required to take the course, and it is strongly recommended for finance students.

NBA 561 Business Law II (also AEM 321)
Spring. 3 credits. Prerequisite: NBA 560 or permission of the 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 of the course covers selected topics in business law, such as employment discrimination, secured transactions, product liability, unfair competition, and international business law.

NBA 562 Estate Planning (also AEM 422)
Fall. 1 credit. Limited to juniors, seniors, and graduate students. D. Grossman.
Fourteen sessions on the various aspects of estate planning. The law and use of trusts, the law of wills, federal and New York state estate and gift taxes, and probate procedures are covered.

NBA 567 Management Writing
Fall, spring. 1.5 credits. B. Mink, A. Pike, C. Rosen.
Students learn to write clearly and effectively by focusing on the writing process as well as the finished product. Course topics include audience perspective, style, organization, strategy, and persuasion. There is a writing assignment every week. Students receive instructor and peer feedback. Priority given to MBA students. Open to other graduate students and faculty.

NBA 568 Oral Communication
Fall, spring. 1.5 credits. B. Mink, A. Pike, C. Rosen.
This course focuses on improving the presentation skills of management students. The course covers the areas of 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 in the seven-week session. The small class size allows for significant individual attention. Students receive feedback from classmates and the instructor. Each student has an opportunity to review in tutorials the videotapes of most of their presentations. Priority given to MBA students. Open to other graduate students and employee degree candidates if there is room.

NBA 569 Management Consulting
Fall, spring. 3 credits. A. McAdams.
The course is case-study oriented and focuses on strategy with multiple objectives. First, it provides students with the opportunity to understand the role of the consultant and to gain indirect experience in that role through dealing with a broad range of practical and real-world issues. Second, it helps students improve their analytic skills through practice with case studies. Third, it provides 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 570 Leadership in Management
Spring. 1 credit. MBA students only. E. Mannix, RPW Executive Development, and other Johnson School faculty.
This course is a partnership with RPW Executive Development to provide MBA students with the self-awareness and interpersonal skills required to be effective leaders (the general principles of leadership course is NBA 668). RPW has partnered extensively with the Johnson School Executive Education Department in the past. The course consists of five full-day training sessions. Stuff from RPW are used to train. The first two days focus on self-awareness and employ several experiential exercises and self-assessment instruments including, the Campbell Leadership Index (CLI), the Kirton Adaptation/Innovation inventory (KAI), and the Ambiguity Preference Scale (APS). Class members are also trained in giving and receiving feedback from each other. Mid-week activities include various leadership and team challenges, including a business simulation. Attendance is required each day. To receive credit, note: most of the self-assessment instruments listed above will need to be completed prior to the first day of class to allow for scoring and analysis.

NBA 571 Cornell Management Simulation
Fall, spring. 1.5 credits. Restricted to second-year MBA students. S. Smith.
The computer-based simulation is played by self-selected teams of four students who make marketing, production, and finance decisions for one of five companies operating competitively in the same industry. After the first week, during which the rules of the simulation are explained and the software used by each team is demonstrated, the teams make periodic decisions (meeting at their own convenience). At the beginning of the simulation, each team writes a Strategic Intent paper and, before the results of the last decision have been determined, each team presents an in-depth analysis of its performance and its strategy for the future in a "board of directors" meeting. Letter grading only, 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. Students who have completed MBA 549 cannot take this course. Open to MBA IIs only. Meetings will be periodic throughout the semester.

NBA 572 Environmental Management Policy
Fall. 1.5 credits. D. Chapman.
The seminar assists participants in remaining current with the rapidly evolving state of the art in the analysis and management of environmental policy and practice in enterprises. Although focused on the private sector, attention is given to understanding the economic basis for government's role in environmental protection. Another focus is the analysis of the operational significance of the concepts of sustainability, efficiency, and market-based environmental policies.
speakers from finance, marketing, electricity, and other businesses with environmental responsibilities meet with the class. Readings and Harvard Business School (HBS) case studies are distributed throughout the semester. Each student makes a case study of an individual enterprise or organization.

**NBA 573 Seminar in Sustainable Development**  
Spring. 1–3 variable credits. A. McAdams. This seminar-style course involves readings and discussions in environmental management, and will also feature four significant outside speakers on the subject of environmental management. (Students interested in doing consulting projects in environmental management will be accommodated in NBA 575, Management Projects.)

**NBA 575 Management Projects**  
Fall, spring. 3 credits. A. McAdams, J. Thomas, R. Allen. This is a full-semester course designed to apply consulting processes to real business problems. Students form consulting teams focused on specific strategic, process improvement, or operational problems in companies. A faculty member and the consultant in residence (CIR) will advise the teams closely engaged in the teams’ work. The teams will meet with the faculty advisers weekly. Sessions will focus on cross-team learning about the application of the consulting process to a variety of consulting engagements. The faculty adviser and or CIR will also meet as needed with each team to work through real-time issues presented by each consulting project. Projects will include local small-business clients, not-for-profits, high Red Incubator, and large national and multinational companies. At the end of the project, each student and team will receive 360-degree feedback from the faculty adviser, CIR, the client, and other team members.

**NBA 578 Consulting Process**  
Spring. 1.5 credits. R. Allen. This half-semester course will focus on understanding and applying the basic consulting process by covering the elements of a consulting engagement, including selling the engagement, scoping the project, contacting with the client, forming the consulting team, creating consultant/client work teams, defining deliverables, developing a work plan, conducting analysis, creating a communication and change plan, managing the project, overcoming resistance and barriers, developing recommendations, presenting the deliverables/implementation plan, and developing potential follow-on work.

The course will be organized around a real client engagement, examining the consulting process from the perspective of the case. Several guest speakers from the consulting engagement will 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 579 Cases in Business Strategy**  
Fall. 1.5 credits. Enrollment limited to second-year MBA students only. J. Szwinski.

A well-defined strategy is essential for business success—describing where the business is going, how it’s going to get there, and then providing a framework for making decisions. The faculty adviser and or CIR will meet with each student to develop a work plan, focusing three sessions on a case. A faculty member and the CIR will advise the teams closely engaged in the teams’ work. The teams will meet with the faculty adviser weekly. Sessions will focus on cross-team learning about the application of the consulting process to different strategic engagements. The faculty adviser and or CIR will also meet as needed with each team to work through real-time issues presented by each consulting project. Projects will include local small-business clients, not-for-profits, high Red Incubator, and large national and multinational companies. At the end of the project, each student and team will receive 360-degree feedback from the faculty adviser, CIR, the client, and other team members.

**International Management**

**NBA 524 Macroeconomics and International Trade**  
Spring. 3 credits. J. Atis. This course introduces the 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 will be informed of national and international economic policies and discerning users of economic analyses and forecasts.

**NBA 548 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 understood. The types of political risks that potential investors are likely to face have changed somewhat over the decades. Nationalization of capital assets is far less of a threat today. At the same time, new political cultures, government instability, changes in monetary and fiscal policy, unpredictability in local tax and regulation regimes, corruption, civil unrest and increasing power of transnational social movements, terrorism, trade disputes and increasing globalization of trade, economic and political, and the power of international financial markets have increased the salience of other forms of political risk.

**NBA 576 World Geopolitical Environment of Business**  
Fall. 3 credits. J. Katz.

The geopolitical face of the world is changing at a pace that few could have envisioned even five years ago. The unification of Germany, the fall of communism and institution of sweeping economic restructuring in the former Soviet Union, the move toward democracy with market economies in eastern Europe, the movement of Europe toward a unified economy, and the frictions with reform and its implications in China for the future of theocnicocical, and China, and the Middle East and the role and fate of developing countries in the world economy. Guest speakers include leading scholars from Cornell and other universities and leaders in business and government.

**NBA 580 Strategies for Global Competitiveness**  
Fall. 3 credits. A. McAdams. Initially, students explore the role of government in several private-market industrialized nations—Japan, France, Germany, the United Kingdom, and Italy—for lessons the United States might learn and use. Students investigate in each of those countries government policies on the global competitiveness of the country’s firms. Special emphasis is given to differential policies appropriate to each of a range of industries, from the mature to the high tech (including computers, telecommunications, and electronics), and to stages of development in each economy. Possible lessons are then tested for less developed countries that might include Venezuela and Malaysia and newly emergent countries such as Singapore. Classes are run in a discussion format. This course can be used to fulfill the strategy requirement.

**NBA 584 International Competitive Strategy**  
Fall and spring. 1.5 credits. J. Katz. The course 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 the management of international competitors, both domestic and multinational.

**NBA 586 Cross-National Management**  
Fall. 1.5 credits. J. Katz. Focuses on the differences in managerial style across countries and develops skills to deal with these differences. Most of the material will be applicable to all countries, though two specific countries will be highlighted each semester.

**NBA 587 International Mergers and Acquisitions**  
Spring. 1.5 credits. J. Hanks. This course addresses the principal business and legal issues in cross-border mergers and acquisitions, including forms and techniques of combining two businesses, negotiation, pricing and other economic terms, due diligence, issuance of securities, antitrust, duties of managers, and the resolution of employee and other social issues. The graded work will be a written proposal for an M&A transaction between two existing companies in different countries prepared by small teams. Proposals will be 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...
The reading will cover the basic business and legal issues most frequently encountered in international mergers and acquisitions. The course will be designed to provide a platform for students to discuss and analyze cases and examples of successful and unsuccessful deals across national boundaries. The course will include a number of guest speakers involved in various stages of international business. The course is intended to provide students with tools to analyze and evaluate the economic transactions and management strategies of multinational enterprises operating in international markets. The course will focus on the process of selecting, financing, and exiting venture capital deals. It will also examine the role of government officials, local business organizations, and other stakeholders in influencing the development of new technologies and new combinations of existing technologies to support management. On occasion, it radically altered business practices and the role of management.

The course is designed to train students to conduct economic transactions and manage businesses over computer networks. It is a phenomenon that has captured the 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 such as processing, communications, networks, databases, expert systems, and multimedia. It also affects a wide variety of managerial issues. Electronic commerce created a new emphasis on information technologies and systems in management. It led to the development of new technologies and new combinations of existing technologies to support management. On occasion, it radically altered business practices and the role of management.
biotechnology and life sciences research, with the dual goals of developing new organizational models of this corporate sector and helping students more effectively perform financial and business evaluations of current and emerging technologies.

**NBA 612 - Disruptive Technologies**  
Fall. 3 credits. D. Greenberg.  
The advances of computer graphics, computer processing power, network bandwidths, and video compression technologies are forcing the merger of the telephone, television, and computer industries. The influence of these technologies has created paradigm shifts that will drastically change the way we communicate, how we are educated, the way we work, design, and in essence, how we will live in the next century. We are just beginning to fathom how these changes will influence our modus operandi and greatly modify our traditional patterns of behavior, both personal and organizational. Clearly, business and industry management will have to understand the implications of the advanced technology. This course starts by presenting historical technological advances that created major paradigm shifts for economies as a whole. Advances in computer technology emphasizing the fundamentals behind the increase in processing power, video and computer graphics capabilities, and network transmission will be presented. The latter part of the course is to introduce the effect of these scientific advances on many discipline-specific areas including photography, the film industry, the entertainment and animation industry, television broadcasting, publishing, as well as the other industry sectors. Sessions are devoted to the social and legal issues arising from the rapid advances in electronic communication. In attempting to predict the disruptive changes of the future, it is best to understand the technologies themselves. Thus, students with technology or science backgrounds are preferred. Although no computer programming is required, a working knowledge of computers is necessary. The course is especially tailored to a business school and industrial concerns and will have interactive live demonstrations at the state-of-the-art laboratory of the Program of Computer Graphics. No prior knowledge in computer science is required.

**Management and Organizations**

**NBA 522 - International Negotiations**  
Spring. 3 credits. W. Adair.  
This course covers all the topics in NBA 666 with a focus on issues particular to an international setting. These include culture (the effect of culture on strategy, goals, communication, etc.), government at the table, currency, and politics. The capstone exercise is a two-party cross-cultural team negotiation matching a student's native culture with that of his or her classmates. Mandatory first-class attendance and attendance is required on all days when we negotiate in class.

**NBA 538 - Inclusive Leadership**  
Spring. 1.5 credits. P. Stepp.  
This course will prepare students for the organizations of today and the future. Readings, discussions, and activities will explore diversity issues for nontraditional employees, and what is needed to change them. Assignments will prepare students for inclusive leadership to address systemic barriers on organizational and personal levels. Students will have the opportunity to work with major companies such as Lincoln Financial, Shell, Cigna, Citigroup, Merck, JP Morgan Chase, IBM, General Mills, Sun Microsystems, BMS, and Johnson & Johnson to explore these issues.

**NBA 663 - Managerial Decision Making**  
Fall. 3 credits. J. Russo.  
This course presents practical concepts from the behavioral sciences that can serve as guides to managerial action. Lectures, case analysis, and lively discussions with accounting students bring new perspectives on decision making, critical thinking, problem solving, and group processes. Taken together, these perspectives offer a trouble-shooter's guide to the uncertainty, complexity, and conflict in the business world.

**NBA 666 - Negotiations**  
Fall, spring. 3 credits. Staff.  
Judgment is the art and science of transforming perception into thought or opinion. Negotiation is the art and science of securing agreements between two or more interested parties. The purpose of this course is to understand the theory and processes of negotiation as it is practiced in a variety of settings. This course is designed to complement the technical and diagnostic skills learned in other courses. A basic premise of the course is that while a manager needs analytical skills to develop optimal solutions to problems, a broad array of negotiation skills are needed 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. The course is largely experiential, providing students with 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 668 - Leading Teams and Organizations**  
Fall 3 credits. M. Thomas-Hunt.  
This course focuses on general principles for successfully leading teams and organizations (the personal development course is NBA 570). The course draws on the latest research in team decision making and organizational leadership to address questions such as: what is the difference between leadership and management? how does a leader establish trust and commitment to an organization? how do leaders transform organizations? The course consists primarily of case studies of leaders, but also includes some experiential and group activities. Course grading is based on class participation, group case analyses, and a final individual case analysis. Priority is given to MBAs.

**NBA 670 - 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 will consider these and other questions on leadership. Most class sessions will be 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 review of relevant leadership theory. The course will begin by examining Louis Gerstner's leadership in IBM's major turnaround in the early 1990s. This case will serve as a frame of reference as we look at two recent contributions to leadership studies: Daniel Goleman's research on emotional intelligence and Howard Gardner's cognitive approach to leadership. The final paper will invite students to work out their own views on leadership.

**NBA 671 - Business Ethics**  
Fall, spring. 1.5 credits. D. Radcliffe.  
Poor moral judgment can ruin a manager's career or even sink a company. In general, an organization cannot survive without the trust of numerous stakeholders, and ethical lapses destroy trust and threaten vital stakeholder relationships. In today's volatile and fiercely competitive business environment, a manager must be able to identify and effectively resolve ethical issues that inevitably arise in the pursuit of business objectives. This course is designed to enhance students' skills in moral reasoning as it applies to managerial decision-making. After examining normative concepts and principles that typically enter into moral reasoning, we will use those concepts and principles to analyze cases. In our discussions, we will seek to understand the moral issues confronting the decision-makers in the cases and explore how those issues might be addressed in ethically responsible ways.

**NBA 672 - Goal Setting and Coaching for Leadership Success**  
Fall, spring. 1.5 credits. P. Stepp.  
This course is designed as a follow-up to NBA 570 Leadership Assessment for Managers. It provides structured support for personal change through personal learning plans, learning and development strategies, and feedback and coaching support from peers. The course includes a workshop on establishing a personal values statement to help guide personal learning plans and align them with career aspirations. The course follows a web-based, follow-through support system to facilitate further leadership growth by prompting students to document their progress while they implement what they learned in the course. Learning coaching strategies and serving as a coach for the year for a classmate will further enhance leadership growth. The course is scheduled throughout the year to allow students time to develop personal goals and provide numerous opportunities to practice coaching.

**NBA 682 - Negotiation Essentials**  
Spring. 1.5 credits. M. Thomas-Hunt.  
This course is designed to complement the technical and diagnostic skills learned in other courses at the Johnson School. While a manager needs the skills to develop optimal solutions to problems, a broad array of negotiation skills is needed in order for these solutions to be accepted and implemented. The course is largely experiential, providing students with 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. Students who have taken NBA 666 cannot take this class.
Marketing

NBA 620 Marketing Research
Fall, spring. 3 credits. Prerequisites: NCC 501 and NCC 503, or the equivalent. S. Gupta, Y. Park.
This course 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. The course 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 interpreting research 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 621 Marketing Communications
Fall. 1.5 credits. Prerequisite: NCC 503 (marketing core). D. Stasman.
The course is designed to give students an understanding of the advertising and promotion management process. It covers the components of a successful advertising campaign and helps students develop an appreciation for the role of communication in advertising planning and decision making. They also learn how recent social-science findings and theory can facilitate advertising management.

NBA 622 Marketing Strategy
Fall. 3 credits. Prerequisite: NCC 503 (marketing core). S. P. Raj.
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. 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.

NBA 623 Customer-Based New Product Development
Fall. 3 credits. Prerequisites: NCC 501 and NCC 503. P. Kumar.
The successful introduction of new products requires careful planning and systematic screening and testing. This course covers models and methods that are useful to managers in the development and marketing of new products. Heavy emphasis is placed on the measurement of consumer preferences. Students are required to complete a group project, consisting of a measurement instrument, data collection (from at least 30 respondents) and data analysis, for a self-chosen product category. The method of instruction consists of a combination of lectures and discussion of cases and articles. Performance is evaluated primarily based on exams and the group project.

NBA 626 Consumer Behavior
Fall, spring. 3 credits. Staff.
Topics include factors that influence response to advertising of various kinds, purchase decisions, product perceptions, response to promotion, consumer satisfaction, and the basic methodologies for understanding consumer behavior.

NBA 633 Marketing and E-Commerce
Spring. 3 credits. Y. Park.
This class explores the effect of the Internet on marketing. Topics include an overview of the e-commerce industry, Internet marketing, and Internet advertising. Students are exposed to the issues, strategies, and techniques of Internet marketing and are exposed to MBA II's because the same information is available for MBA I's in the strategy core.

NBA 639 Data-Driven Marketing
Spring. 3 credits. S. Gupta.
This course deals with the use of data to make marketing decisions. It introduces concepts, methods, and applications of decision modeling to address marketing issues such as segmentation, targeting, positioning, promotions, advertising, and sales force deployment. The course is focused on conceptual material, this course will provide skills to translate conceptual understanding into specific operational solutions—a skill in increasing demand in the organization. The course will be particularly valuable to students planning careers in management consulting, marketing, and market research. It is designed for students who have some background in quantitative methods and have a willingness to deal with mathematical concepts.

NBA 692 Economics of Pricing
Fall. 1.5 credits. J. Johnson.
One of the most common and important decisions for a manager to make is the pricing decision. This course provides an economics perspective on the pricing decision. The goal of the course is to think rigorously about a variety of pricing issues. Specific topics include price discrimination, peak-load pricing, channel pricing, and durable goods pricing.

Operations Management

NBA 641 Business Logistics Management
Spring. 3 credits. Prerequisite: NCC 508, OR/IE 410, or permission of the instructor. L. J. Thomas.
The course is about supply-chain integration, which involves strategic management of the value chain, from materials to customer. Students discuss operations strategy issues that are important to both manufacturing and service. The course emphasizes written and oral communication skills. About a fourth of the classes are spent on case studies, with small groups presenting their analyses of them. There is one mid-term examination, but the majority of the grade is evaluated based on projects and class participation. There is an option of replacing some assignments with a "live case," a project with a local company.

NBA 643 Managerial Spreadsheet Modeling
Fall. 1.5 credits. L. Robinson.
The goal of this course is to develop proficiency in quantitative modeling within the environment of Microsoft Excel. This hands-on lab-style course, taught in the Parker Center, will develop and use spreadsheets to analyze a variety of business problems. There are two principal components of this course: spreadsheets and models. Spreadsheet topics to be covered include principles of good spreadsheet design, the effective presentation of information through spreadsheets (including graphical controls like sliding bars), and advanced Excel features (e.g., data validation, conditional formatting, scenarios, etc.). Modeling topics include the art of finding the appropriate level of modeling detail, practice in dealing with vague and unstructured problems, sensitivity analysis, and working with incomplete and unreliable data.

NBA 647 Advanced Spreadsheet Modeling
Fall. 1.5 credits. L. Robinson.
The goal of this hands-on lab course, taught in the Parker Center, is to develop proficiency with Excel's quantitative tools of Solver (for optimization) and @Risk (for simulation). Building on their brief introduction in the Managing Operations core course, students use these advanced tools to analyze problems and cases in finance, marketing, and operations. Although the bulk of this course is devoted to case analysis, occasional lectures introduce some advanced features of these two powerful modeling tools, including integer and nonlinear programming and sensitivity analysis within optimization, and correlated random variables, scenario analysis, and valid statistical analysis within simulation.

NMI AND NRE RESEARCH AND ADVANCED STUDIES

NMI 500-502 Directed Reading and Research
Fall, spring. 1, 2, or 3 credits. Staff.
Students undertake special projects in research under the supervision of faculty members. Registration is limited to students who have the approval of their advisers and of the faculty members involved in the research.

NMI 510 Multi-Cultural Work Environments
Spring. 1 credit. C. Rosen, B. Mink.
NMI 510 is an independent study course that is open to students whose summer internships will be in a country other than that of their citizenship or prior work experience. The goal of the course is to promote an understanding of the cultural assumptions we bring to the work environment and the effects of cultural differences on organizational interactions and productivity. Registration
for the course occurs in the spring semester prior to the internship, and grades are posted in the following fall semester after completion of the course project (a 10-page paper). Students may register for the course after obtaining an internship offer and completing the paperwork for the course instructors. International students obtain and process work authorization forms with the International Students Office. See Charlotte Rosen (Sage 304) for further details about the academic and immigration requirements for NMI 510.

DOCTORAL SEMINARS

NRE 502 Doctoral Seminar in Marketing
3 credits. Staff.
This class introduces students to empirical research in marketing. 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. However, by the very nature of the class, the content is to some extent driven by the participants in the course. Teaching is interactive, and each participant is expected to present one of the papers studied to the rest of the class. Furthermore, each participant is expected to reply to the results of one of the papers, requiring the participant to write the necessary code and briefly discuss their findings.

Enrollment is by consent of the instructor. Students are required to have taken a graduate level course in either mathematical statistics or econometrics, although this restriction may be waived in special cases. Students are welcome to sit in on parts of the class; for example, the section on Bayesian Methods will be broad enough that students from other areas may find the presentation useful.

NRE 504 Judgment and Decision Making, Research and Accounting
3 credits. This course is for Ph.D. students only. M. Nelson, R. Libby.
The seminar provides a rigorous and integrative exposure to those aspects of the literature in accounting, behavioral economics, and psychology that are related to questions of accounting and auditing theory and research.

NRE 518 Marketing Models
Spring. 3 credits. Y. Park.
This course is a study of model-based research in the marketing literature. The course has three main objectives: 1) develop the student's knowledge of the technical details of various techniques for analyzing data; 2) expose students to "hands-on" use of various computer programs for carrying out statistical data analyses; 3) ask students to propose a model of consumer market behavior that potentially constitutes a contribution to the literature.

NRE 523 Doctoral Seminar in International Management
Spring. 3 credits. A. Un.
Provides an overview of the evolution of the field of international marketing; its domain and professional organization, the key issues and how they have changed over time, and the evolving links between the approaches of this field and related disciplines. Readings focus on the classics of the field and some more-recent work that both extends and challenges the established approaches. The seminar is organized in three parts that reflect the interdisciplinary character of international management research. The first and second parts review the existence of MNEs from the perspective of economics/political economy and sociology/organization studies. The third part focuses on the management of firms across different institutional environments and the impact of the transformation of those environments on firms.

NRE 525 Seminar in Foundations of Corporate Finance
Fall. 1.5 credits. R. Micheal.
This course covers applications of corporate finance. We start with the classic Modigliani and Miller theory. Subsequent topics are built around this foundation. We analyze the effect of several market imperfections, such as taxes, incomplete contracts, asymmetric information, and cost of financial distress on corporate financial policy and on capital structure decisions in particular.

FACULTY ROSTER

Adair, Wendi, Ph.D., Northwestern U. Asst. Prof., Management and Organizations
Bailey, Warren B., Ph.D., U. of California at Los Angeles. Assoc. Prof., Finance
Benn-David, David J., Ph.D., Massachusetts Inst. of Technology. Don and Margi Berens Professor of Entrepreneurship
Bhojraj, Sanjeev, Ph.D., U. of Florida. Asst. Prof., Accounting
Bierman, Harold Jr., Ph.D., U. of Michigan. Nicholas H. Ogden Professor of Business Administration
Bloomfield, Robert J., Ph.D., U. of Michigan. Assoc. Prof., Accounting
Bradley, James R., Ph.D., Stanford U. Asst. Prof., Production and Operations Management
D'Souza, Julia, Ph.D., Northwestern U. Assoc. Prof., Accounting
Dyckman, Thomas R., Ph.D., U. of Michigan. Ann Whitney Olin Professor of Accounting
Frank, Robert, Ph.D., U. of California at Berkeley. Professor of Economics
Greenberg, Donald P., Ph.D., Cornell U. Prof., Management Information Systems
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. Prof., Finance and Business Strategy
Hilton, Ronald W., Ph.D., Ohio State U. Prof., Accounting
Hirsh, Samuel P., Ph.D., U. of Iowa. Asst. Prof., Accounting
Hutton, John P., Daniel P., Ph.D., Massachusetts Inst. of Technology. John P. and Rilla Neafsey Professor, Computing and Information Systems and Business
Ise, Alice M., Ph.D., Stanford U. S. C. Johnson Family Professor of Management, Prof., Marketing
Jarroll, Robert A., Ph.D., Massachusetts Inst. of Technology. Ronald P. and Susan E. Lynch Professor of Investment Management, Prof., Finance and Economics

Johnston, Justin, Ph.D., M.I.T. Asst. Prof., Economics
Kadiyali, Vinutha, Ph.D., Northwestern U. Assoc. Prof., Marketing and Economics
Lee, Charles M., Ph.D., Cornell U. Prof., Accounting and Finance, Henrietta Johnson Louis Professor of Management, Director, The Park Center for Investment Research
Li, Haitao, Ph.D., Yale U. Asst. Prof., Finance
Libby, Robert, Ph.D., U. of Illinois. David A. Thomas Professor of Management, Prof., Accounting and Behavioral Science
Macey, Jonathan R., Ph.D., Yale U. J. DuPratt White Prof. of Law, Prof., Business Administration
Mannix, Elisebeth, 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
Michaely, Roni, Ph.D., New York U. Prof., Finance
Nelson, Mark W., Ph.D., Ohio State U. Prof., Accounting
O'Conner, Kathleen, Ph.D., U. of Illinois. Assoc. Prof., Management and Organizations
O'Hara, Maureen, Ph.D., Northwestern U. Robert W. Purcell Prof. Management, Prof., Finance
Orman, Levent V., Ph.D., Northwestern U. Prof., Management Information Systems
Park, Young-Hoon, Ph.D., U. of Pennsylvania. Assoc. Prof., Marketing
Rao, Vithala R., Ph.D., U. of Pennsylvania. Deane W. Malott Professor of Management, Prof., Marketing and Quantitative Methods
Robinson, Lawrence W., Ph.D., U. of Chicago. Assoc. Prof., Operations Management
Russo, J. Edward, Ph.D., U. of Michigan. S. C. Johnson Family Prof. Management, Prof., Marketing and Management and Organizations
Sine, Wesley, Ph.D., Cornell U. Prof., Management and Organizations
Smith, Seymour, Ph.D., U. of Chicago. Nicholas H. Noyes Professor of Economics and Finance, Director, Leadership Skills Program
Swaminathan, Bhaskaran, Ph.D., U. of California at Los Angeles. Assoc. Prof., Finance
Thomas, L. Joseph, Ph.D., Yale U. Nicholas H. Noyes Professor of Manufacturing, Associate Dean, Academic Affairs
Thomas-Hunt, Melissa, Ph.D., Northwestern U. Assoc. Prof., Management and Organizations
Un, Anique, Ph.D., M.I.T. Asst. Prof., Management and Organizations
Waldman, Michael, Ph.D., U. of Pennsylvania. Prof., Economics, Charles H. Dyson Prof., Management
Weinbaum, David, Ph.D., New York U. Asst. Prof., Finance
Zhang, Xiaoyan, Ph.D., Columbia U. Asst. Prof., Finance

Lecturers
Katz, Jan, Ph.D., Massachusetts Inst. of Technology, Sr. Lect., International Business and Marketing
Mink, Barbara E., M.A., Cornell U. Sr. Lect., Management Communications
Pike, Alan S., M.A., Cornell U. Sr. Lect., Management Communications
Rosen, Charlotte, Ph.D., Cornell U. Sr. Lec.,
Coordinator, Management Communications
Suwinski, Jan H., MBA, Cornell U. Sr. Lecturer,
Business Operations

Adjunct and Visiting Faculty
Grossman, Dale A., J.D., American U. Sr. Lec.,
Tax and Business Law
Nesheim, John L., MBA, Cornell U. Visiting
Lecturer, President, Aladdin Systems, Inc.
Schuler, Richard E., Ph.D., Brown U. Prof.
Economics, Prof. Civil and Environmental
Engineering
LAW SCHOOL

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 its 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 to 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 (Panthéon-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 June 2004. For updated law descriptions visit: www.lawschool.cornell.edu

FIRST-YEAR COURSES

LAW 500 Civil Procedure
Full year. 6 credits. S-U option unavailable. K. M. Clermont, B. J. Holden-Smith, J. J. Rachlinski, 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 502 Constitutional Law
Fall. 4 credits. S-U option unavailable. B. Meyler, T. W. Morrison, S. H. Shifrin, G. J. Simpson. 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 504 Contracts
Full year. 6 credits. S-U option unavailable. R. A. Hillman, R. S. Summers, W. F. Taylor. 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 obligations, including the substantive reasons underlying the rules and principles.

LAW 506 Criminal Law
Spring. 4 credits. S-U option unavailable. S. P. Garvey, T. W. Morrison. 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 508 Lawyering
Full year. 4 credits. S-U option unavailable. P. S. Anderson, J. B. Atlas, T. A. Davis, L. Knight, E. M. McKee, A. J. Mooney. This course introduces first-year students to lawyering skills, with primary emphasis on legal writing, analysis, and research. In the context of a law office, students create some of the essential legal writings that lawyers produce. Students determine and investigate the essential facts to support their client's case by interviewing or deposing various witnesses. Students may also write a client letter, using plain English to explain to their client the law and the merits of the case, and advise the client on the best course of conduct. Finally, students develop their oral and written advocacy skills and start thinking about litigation strategy by researching and writing persuasive memoranda or legal briefs for a trial or appellate court. At the end of the year, the students orally argue their case. Instruction occurs not only in meetings of the class as a whole but also in individual conferences. Each student receives extensive editorial and evaluative feedback on each written assignment.

LAW 512 Property

LAW 515 Torts
Fall. 4 credits. S-U option unavailable. G. A. Hay, M. Heise, J. A. Henderson, Jr., W. F. Wendel. An introduction to the principles of civil liability in the tort field: intentional wrongs, negligence, and strict liability. Attention also is given to the processes by which tort disputes are handled in our legal system.

GRADUATE COURSES

LAW 607 Advanced Legal Research—U. S. Legal Research for LL.M. Students
Fall. 1 credit. Graduate program grading: H, S, U. Limited to graduate students. Limited enrollment. P. G. Court. This course introduces LL.M. students to basic legal research in U.S. materials that will be valuable to them in their work 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. To a large extent, instruction uses online materials that are 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. The textbook is Basic Legal Research: Tools and Strategies, 2d ed., 2003. 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 percent each).

LAW 622 Contracts in a Global Society
Spring. 4 credits. Graduate program grading: H, S, U. Limited to graduate students. W. F. Taylor. 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
LAW 676 Principles of American Legal Writing
Fall, spring. 2 credits. Graduate program grading: H, H, S, U. Limited to graduate students. Limited enrollment.
C. M. Hannah-White, P. J. Warth.
This course provides foreign-trained lawyers with an introduction to the American legal system and essential principles of legal writing in the United States. Students are afforded an opportunity to practice some of the forms of writing common to American legal practice, by drafting documents such as client letters, memoranda, briefs, and pleadings in the context of representing hypothetical clients.

LAW 602 Advanced Civil Procedure: Complex Litigation
Fall. 3 credits. S-U option available. S. Niel.
This course familiarizes students with the doctrines, procedures, and rules, including but not limited to consolidation, class action, and preclusion, that are being utilized to resolve complex civil disputes involving multiple parties, claims, and jurisdictions. The course also explores the policy and management challenges presented by the litigation of complex civil disputes.

LAW 600 Accounting for Lawyers
Spring. 2 credits. S-U option available.
R. A. Sarahan.
This course is designed to introduce 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 (balance sheets, income statements, statements of cash flow), 3) the interpretation and analysis of financial statements, and 4) the use and misuse of accounting information. The goal of the course is to enable students to critically evaluate a company's financial statements. The course is intended primarily for students with little or no prior background in bookkeeping or accounting and is limited to students who have had no more than 6 credit hours of accounting (or its equivalent) or permission of the instructor.

LAW 601 Administrative Law: The Law of the Regulatory State
Fall, spring. 3 credits. S-U option unavailable. Limited enrollment.
C. R. Farina, 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, and procedural modes of administrative policy making; judicial review of agency action; and the procedures and control of 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 603 Advanced Corporate Law
Fall. 3 credits. Availability of S-U option to be announced first day of class. J. C. Dummann.
This course examines various topics not covered in detail in the basic Corporations course, such as regulatory competition in corporate law, corporate distributions, the role of the board of directors in corporate law, employee stock ownership plans, non-profit corporations, insurance corporations, cooperatives, and transnational mergers and acquisitions. In examining these topics, the course seeks to develop a deeper understanding of central issues in corporate law and policy. What is the function of corporate law? Who owns corporations and why? What are the forces shaping corporate law in the United States? Who should regulate corporate law issues? To what degree should corporate law regimes rely on standards as opposed to rules? How do the corporate law regimes of different countries interact?

LAW 605 Advanced Legal Research in Business Law
Spring. 1 credit. S-U option available. J. M. Callihan.
This course introduces students to print and online sources for researching business law. "Business law" is a broad term that covers a variety of topics such as corporate law, securities, banking, antitrust, employment, and taxation. In addition to revisiting the standard legal research sources, students learn about specialized resources including financial reports, SEC filings, company information, historical and current industry and market research, and economic and financial data. The focus is on research strategy and evaluation of resources. The course includes short lectures, hands-on computer lab sessions introducing students to commercial and free databases, and some instruction by a business librarian on business databases. There are selected readings in lieu of a required textbook and assignments using the resources learned in class.

LAW 606 Advanced Legal Research—International and Foreign Law
Fall. 1 credit. S-U option available. T. Mills.
Globalization has led to the internationalization of the practice of law. This course provides an overview of research resources, methods, and strategies for international and foreign law. Topics covered include 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 610 Antitrust Law
Fall. 2 or 3 credits. (Students who have taken the Antitrust course in the Paris program will receive 2 credits for this course. All others will receive 3 credits.) S-U option unavailable. G. A. Hay.
The antitrust laws of the United States 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 611 Arbitration Law and Practice
Fall. 2 credits. S-U option available. P. S. Nelson.
This course is designed to familiarize students with both the law and practice of arbitration. Arbitration is the principal method of resolving disputes between unions and employers, securities brokers and their customers, and under international business agreements, and it is gaining favor in many other areas, including consumer, construction, and insurance disputes. This course explores the doctrines governing arbitration, including arbitrability, arbitral due process, and judicial review of arbitration awards. In addition, this course provides an introduction to the practice of arbitration, including drafting arbitration agreements, drafting claims, engaging in discovery, conducting prehearing conferences and hearings, and filing posthearing submissions.

LAW 612 Bankruptcy
Spring. 3 credits. S-U option unavailable.
T. Eisenberg.
Selected topics in the law of bankruptcy. An overview of the various bankruptcy chapters and a detailed study of the 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 613 Business Organizations
Fall, spring. 4 credits. Availability of S-U option to be announced first day of class. J. C. Dummann, R. C. Hockett.
An introduction to the legal rules and principles, as well as some of the economic factors, that pattern the conduct of productive enterprise in the United States. The principal focus is on the large, publicly traded corporation that dominates much of the U.S. business environment—in particular, its financing, its control, and the potentially conflicting interests that the form must mediate. Legal topics to be covered include shareholder and executive compensation, basic fiduciary obligations, shareholder voting rights, derivative suits, corporate reorganization, and control transactions. We also devote attention to partnerships, closely held corporations, and other business forms and take note of particular industries and divergent (generally, jurisprudential) domains of productive organization to place what is distinctive about the principal American form into broader perspective. No prior background in business law or economics is assumed.

LAW 614 Business Practices
Fall. 3 credits. S-U option available.
Prerequisite: Corporations or (for graduate students) an equivalent course elsewhere. S. J. Schwab.
Each week a visiting practicing lawyer presents a business-law problem and conducts the class. The problems cover a wide variety of topics, such as incorporating a business from a foreign jurisdiction into Delaware, or compliance with the Sarbanes-Oxley audit requirements. Students are assigned to teams. Over the course of the semester, each student writes two five-page papers on a particular week's topic and provides written comments on other student papers in the other weeks as well as participates in class discussions. No final examination.

**LAW 616 Comparative Law: The Civil Law Tradition**
Spring. 3 credits. S-U option available.
M. Lasser.

This course introduces students to the institutional and conceptual organization of "civil law" legal systems (which govern almost all of Western and Eastern Europe and Latin America, as well as significant portions of Asia and Africa). 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.

**LAW 619 Conflict of Laws**
Fall. 3 credits. S-U option available.
A. Riles.

This course addresses the subject of conflict of laws in its theoretical and historical context and places a special emphasis on the international elements of conflict of laws. There is a three-hour in-class final examination which involves both issue spotter questions and more theoretical questions.

**LAW 620 Constitutional Law II: The First Amendment**
Spring. 3 credits. S-U option available.
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 621 Constitutional Remedies**
Spring. 2 credits. S-U option unavailable.
T. Eisenberg.

Explores in-depth the history and current status of 42 U.S.C. section 1983, the major statutory vehicle for vindication of constitutional rights in civil cases.

**LAW 623 Copyright**
Spring. 3 credits. S-U option available.
D. L. Burk.

Copyright law has become increasingly important as the American economy has shifted from a predominantly manufacturing economy to an information economy. This course provides students with a comprehensive overview of U.S. copyright law. It begins with coverage of the substantive and procedural requirements for qualifying for copyright protection, then provides an in-depth study of the rights granted to authors under this law, the standards for judging copyright infringement, public policy limitations on the scope of copyright interests (such as the fair use defense), and remedies available to successful litigants. Issues raised by new information technologies and recent amendments addressing them receive special attention. Partly as an aid to understanding U.S. law better and partly because copyright law is of increasing international importance, the course also provides some comparative and international copyright law components. In addition, the course focuses on issues of trademark and right-of-publicity law as they overlap or complement copyright.

**LAW 626 Criminal Procedure**
Spring. 3 credits. S-U option available.
M. Goldsmith.

This course surveys the law of criminal procedure, with emphasis on the constitutional and case law that regulates the pretrial stage of the criminal process. More specifically, the course 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 628 Cyberspace Law**
Spring. 3 credits. S-U option available.
D. L. Burk.

This course exposes students to the study of the rules and norms governing the control and dissemination of information in a computer-mediated world. Because information is distributed through computers capable of copying, filtering, or altering information, it is now possible to control and manipulate information at various levels throughout the network and to an extent that were otherwise impossible or impractical. While existing doctrines such as freedom of speech, intellectual property, and privacy are familiar doctrinal and theoretical starting points, cyberspace allows, and often requires, a reexamination of the values underlying those areas of law. This reexamination is necessary not only to translate those values into cyberspace applications, but to alter existing rules and legal institutions in real space as well. To give one example, the value of studying cyberspace law is not only about answering whether data stored in Random Access Memory should be considered a copy under copyright law, whether copyright protection or the control of information in any form is necessary in a world in which information can be perfectly reproduced and distributed globally at almost no expense.

**LAW 630 Directed Reading**
Fall, spring. 1 or 2 credits. Must be taken S-U. Arrange directly with instructor. See the Law School registrar.

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 631 Education Law**
Spring. 3 credits. S-U option available.
M. Reise.

This course focuses on selected legal issues that arise in the public and private education context, with emphasis on the elementary and secondary school setting. Topics considered include the legal and policy dimensions of the rights of students, parents, educators, and the state with respect to such issues as access to, control over, and regulation of the education setting and institutions. Issues germane to equal educational opportunity, school finance, and school governance and regulation receive particular attention.

**LAW 632 Employment Discrimination and the Law**
Fall. 3 credits. S-U option available.
R. Lieberwitz.

A study of laws against employment discrimination based on race, religion, sex, national origin, age, and disability.

**LAW 633 Employment Law**
Spring. 3 credits. S-U option available.
L. Bush.

Survey of common law doctrines and selected federal statutes affecting the private sector employer-employee relationship, but not including union formation and collective bargaining or employment discrimination (students interested in these subjects should take the Labor Law and/or Employment Discrimination courses offered in the 2004--2005 curriculum). Common law topics include: the employment at will rule and its exceptions; employee duties of loyalty and covenants not to compete; unjust dismissal; and employee reputation and privacy interests. Federal statutory topics include: the Fair Labor Standards Act (minimum wage and overtime); the Occupational Safety and Health Act; and the Family and Medical Leave Act.

**LAW 636 Environmental Law**
Spring. 3 credits. S-U option unavailable.
Recommended prerequisite: Corporations.
J. F. Rabl.

The course surveys the major environmental laws, with a primary focus on federal statutes. Emphasis is placed on the various sources of liability to both individuals and corporations from contamination, statutory provisions, administrative regulation, and enforcement policy. Corporate successor liability through mergers and acquisitions is included, including the increasing importance of performing a full 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 637 Estate and Gift Taxation**
Fall. 2 credits. S-U option available.
Prerequisite: Federal Income Taxation.
L. Kahng.

This course surveys the three federal taxes imposed on wealth transfers: the estate tax, the gift tax, and the generation skipping tax. The course uses a problem-oriented approach with emphasis on the economic, procedural, and malpractice pitfalls that lawyers encounter in civil litigation practice. We do not focus simply on the model rules, but consider the entire law governing lawyers as applied to civil litigators, including such issues as conflicts of interest, investigation and discovery (including the attorney-client privilege, perjury, ex parte contacts, and E-discovery), motions practice, settlement negotiations, and forensic tactics. The course is designed to...
expose students to problems typically faced by litigators in medium-sized to large law firms handling complex disputes, but it is also applicable to lawyers working in small firms or government agencies who do a significant amount of civil litigation.

LAW 640 Evidence
Fall, spring. 3 credits. S-U option available. Limited enrollment. F. R. Rossi, M. Goldsmith. The rules of evidence in civil and criminal cases with emphasis on relevance, hearsay, authentication, witnesses, and experts. The course focuses on the Federal Rules of Evidence, with some attention to how they diverge from the common law.

LAW 642 Family Law
Spring. 3 credits. S-U option available. R. Graycar. Broadly understood, family law is the study of state-imposed rules regulating intimacy and familial relationships in society. In this course we use scientific and social scientific information to evaluate our assumptions and beliefs and to call into question the appropriateness of a number of current state laws regulating families. We examine the evolution of our society's understanding of and expectations for marriage, as well as shifts over the past several decades in the nature of and justification for state regulation of that institution. Substantial attention is devoted to the social and legal consequences of marriage dissolution, including child custody, child support, property distribution, and spousal maintenance. Other topics considered include definitions, policies, and trends in American family law, the legal significance of marriage rights and obligations; private ordering within the marital context; and nonmarital relationships rights and obligations.

LAW 643 Federal Courts
Fall. 3 credits. Availability of S-U option to be announced first day of class. Prerequisites: Constitutional Law and second semester of Civil Procedure. Students without such background should consult with the instructor. This course examines the various constitutional and statutory doctrines that control access to the federal courts to vindicate federal rights. It is particularly valuable for those planning a career in public interest or the public sector, anyone else expecting to litigate extensively in federal court, and students who have or hope to obtain a judicial clerkship. Topics covered include case or controversy limitations, including standing; constitutional and statutory limits on judicial review; and the role of the federal courts in constitutional and statutory rights, including 42 U.S.C §1983 and Bivens actions; and bars to such actions, including the various abstention doctrine and the emerging law on 11th Amendment and sovereign immunities.

LAW 644 Federal Income Taxation
Fall, spring. 4 credits. S-U option available. Limited enrollment. R. A. Green, L. Kheh. 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 645 Federal Indian Law
Spring. 2 credits. D. B. Sugete. Course description to be announced.

LAW 646 Financial Institutions
Spring. 4 credits. Availability of S-U option to be announced first day of class. R. C. Hockett. An introduction to the regulatory structures, as well as some of the economic and technological factors, that pattern the conduct of financial intermediation in the United States. The principal focus is on banks, and to a slightly lesser extent on investment companies (mutual funds), insurance companies, pension funds, and securities firms in so far as these institutions discharge a common set of economic functions and give rise to a common set of systemic economic risks. Legal topics covered include entry, branching, and geographical restrictions; competition-promise; capital adequacy, solvency-, and other forms of risk-regulation (including disclosure requirements); community-reinvestment; self-regulation; and insolvency and deposit insurance. We also devote some attention to "alternative" financial service providers such as check-cashing services, community development financial institutions, and providers; and we take note of the divergent (generally, non-American) jurisdictions' dominant modes of financial intermediation and of the "globalization" of finance to place what is distinctive about American forms in bolder relief and better to understand the forces operating behind recent and still unfolding changes to the American (and global) financial and finance-regulatory environments. No prior background in financial law or economics is assumed.

LAW 647 Health Law
Fall. 3 credits. S-U option available. 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, and quality, and it addresses the use of regulation, litigation, and market-driven strategies in efforts to resolve 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 health care system. Source materials include historical and deal structures from a practitioner's perspective, analysis of how the "globalization" of finance to place what is distinctive about American forms in bolder relief and better to understand the forces operating behind recent and still unfolding changes to the American (and global) financial and finance-regulatory environments. No prior background in financial law or economics is assumed.

LAW 648 The History of the Common Law in England and America
Spring. 3 credits. S-U option available. B. Meyer. The right to a trial by jury, the presumption of public access to criminal proceedings, and citizenship by birth rather than blood, all enshrined in the U.S. Constitution, ultimately derive from English common law. American private law—including contracts, torts, and property—is indebted to the same heritage. This course examines the history and theoretical common law with the aim of demonstrating its continuing relevance. Three principal strands run through the class: the first traces the substantive and procedural evolution of the common law from its early English roots and a brief role in the American legal system today, with particular emphasis on the sixteenth through nineteenth centuries. Another thread emphasizes conceptions of the common law, including both historical accounts derived from the writings of Sir Edward Coke, Jeremy Bentham, and Oliver Wendell Holmes, and more recent theoretical contributions by Guido Calabresi and Ronald Dworkin, among others. Finally, the course examines certain central institutions of the common law, including the judge who follows precedent and the jury, and compares common law modes of adjudication with the alternative methods employed by the chancellor in equity and judges in the civil law system. Source materials include historical cases and documents as well as some secondary articles.

LAW 649 The IPO Process and Deal Structure Alternatives (also MBA 563)
Fall, spring. 3 credits. S-U option available. Prerequisites: Corporations. Limited enrollment. Z. J. Shulman. An in-depth look at initial public offerings and deal structures from a practitioner's point of view. With respect to initial public offerings, the course covers the applicable statutory framework, pre-offering corporate preparations (such as the implementation of poison pills and stock option plans), 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, selection of a trading forum (i.e., NYSE, NASDAQ, or AMEX), and the role of securities analysts. Regarding deal structures, the course explores choosing an appropriate valuation structure (i.e., stock versus asset sale, merger, etc.), deal financing alternatives, due diligence, public company transaction issues (i.e., anti-takeover matters and directors' fiduciary duty concerns), and crucial legal and business aspects of the acquisition, such as caps/limits, letters of intent, successor liability, continuity of employees, and noncompetition agreements and reacting to hostile bids.

LAW 650 Insurance Law
Fall. 3 credits. S-U option available. 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, health care, disability, and liability insurance and claims processes. The emphasis throughout the course is on the links between insurance theory, doctrine, and modern ideas about the functions of private law.

LAW 652 International Business Transactions
Spring, 2 credits. Availability of S-U option to be announced first day of class. L. M. Brennan. This course provides an overview of different commercial legal systems; analysis of private and public law aspects of international business transactions and the legal rules governing such transactions; review of private international law transactions, including international sale of goods, letters of credit, and commercial documents; selection of appropriate mechanism for international business (joint venture, branch, subsidiary, technology license); overview of foreign direct investment, debt financing, and technology transfers; review of the applicable dispute resolution mechanisms (international litigation, commercial arbitration and other means of international commercial dispute settlement) including issues such as governing law, choice
of forum, and applicable treaties; and analysis of international implications of U.S. law including the U.S. Foreign Corrupt Practices Act and U.S. antitrust law.

LAW 653 International Commercial Arbitration
Fall. 3 credits. S-U option available.
J. J. Barceló III.
A study of arbitration as a dispute resolution process for international trade and business disputes. The course analyzes institutional and ad hoc arbitration, the authority of arbitral panels, enforcement of agreements to arbitrate, challenging arbitrators, procedure and choice of law in arbitral proceedings, and enforcement of international arbitral awards. The course also special attention to the international convention on the recognition and enforcement of international arbitral agreements and awards (New York Convention) and the UNCITRAL (U.N. Commission of International Trade Law) arbitral rules and model law. It focuses on commercial arbitration as an international phenomenon and not on arbitration under any particular national system.

LAW 656 International Organizations and International Human Rights
Fall. 3 credits. S-U option unavailable.
M. B. Nidalo.
The course comprises two segments: a) international organizations and b) International Human Rights. In the international organization segment, the course aims at providing a comprehensive legal analysis of problems concerning membership, the structure of the United Nations organization, and its functions in the context of the United Nations Charter. It also considers the use of force under international law with specific reference to the United Nations Charter. The course further considers the structure, jurisdiction, and functions of the International Court of Justice. In the human rights segment, the objective is to introduce the theory, norms, and institutions central to the international human rights legal regime. The course explores the emergence and the enforcement of international human rights norms and the international machinery for the protection of human rights in the world community, including the United Nations Human Rights Committee, the European Court of Human Rights, the Inter-American Court of Human Rights, and the International Criminal Court. Relevant decisions of these courts and of municipal courts are studied as well as basic documents.

LAW 657 Introduction to the Law of Patents
Fall. 2 credits. S-U option available.
A. W. Shaw.
This course provides a basic working knowledge of the principles of patent law. It opens with a review of patent fundamentals (the parts of a patent, overview of the patent procurement process, and overview of the patent enforcement process). It then focuses on specific issues of claim interpretation, claim validity, and infringement (both literal and under the doctrine of equivalents). The course culminates in a review of some of the recent proposals for reform of the patent system in the United States.

LAW 658 Investment Law in the People's Republic of China
Fall. 3 credits. Availability of S-U option to be announced first day of class.
N. C. Howson.
This course examines the law and practice of complex investment or financing-related transactions, focusing on the PICC today. After brief introductory sessions devoted to China’s legal reform and the economic reforms of the last two decades and China’s recent accession to the World Trade Organization (WTO), the course focuses on discrete aspects of law and practice in the PICC, including foreign trade, foreign direct investment, mergers and acquisitions, equity and venture capital investment (and exits), company law, and the restructuring of state-owned enterprises, domestic and foreign-invested M&A, initial public offerings (in China and internationally), and the Deputy capital markets, project finance (focusing on large infrastructure projects like power plants, water treatment plants, and toll roads), technology and intellectual property licensing, land use rights and real estate development, international oil and gas production sharing arrangements, foreign exchange control and regulation, and dispute resolution (complex litigation and arbitration). Some significant portions of class time are devoted to discussion and role-playing based on transaction/case hypotheticals, and all students are expected to participate in a (graded) mock acquisition or financing negotiation at the end of the course. Materials include primary sources (laws, regulations, and interpretations), so that students can learn to assimilate statutory material quickly and develop skills critical to transnational commercial and investment law practice.

LAW 659 Labor Law
Spring. 3 credits. S-U option available.
R. Lieberman.
This course focuses primarily on the law regulating employee collective action and labor unions. Topics include union organizational campaigns, strikes and other forms of lawful industrial action, the National Labor Relations Act, and the enforceability and enforcement of collective agreements. The course also includes topics relating to individual rights of employees under the law against employment discrimination based on race, sex, national origin, and religion.

LAW 660 Law and Social Change: International Experience
Fall 3 credits. S-U option available.
M. E. Greenberg.
This course is intended for students interested in law reform and international development. As compared with courses about international law, this course draws from an international base of experience while focusing on international laws in the context of socio-economic change: How do the concepts of “social change” and “development” differ? When does it suffice to draft and promote passage of new laws? When must the introduction of new laws be preceded or accompanied by other approaches, such as legal literacy training or public education? Who may be the stakeholders: ministries of justice, nongovernmental organizations, bar associations, or others? Issues are illustrated by case studies drawn from Eastern Europe, Asia, Latin America, and Africa. Social change topics range from war and peace, gender, and the family to democracy building and environmental protection.

LAW 663 The Law of the European Union
Fall. 3 credits. S-U option available.
R. Lieberman.
This course introduces students to the law and institutions of the European Union. It examines the composition, organization, functions, and powers of the union’s governing bodies; analyzes the union’s justice and commercial law; and studies the union’s decision-making processes. The course also explores broader questions of political, economic, and legal integration, such as the proper relation between the union’s law and
the domestic law of the union's member states and the desirability and feasibility of using the E.U. as a model on which to pattern other transnational agreements. There is an eight-hour take-home exam.

**LAW 668 Legal Aspects of Foreign Investment in Developing Countries**
Spring. 3 credits. S-U option unavailable.
M. B. Ndulo.
This course studies legal aspects of foreign investments in developing countries. It seeks to identify legal problems that are likely to affect investment in a developing country. Inter alia, it deals with the public international law principles and rules governing the establishment by foreign businesses of various factors of production (persons and capital) on the territory of other states and the protection of such investments. Thus, the course includes a discussion of the following topics: economic development and foreign capital; obstacles to the flow of investment to developing countries; guarantees to investors and investment codes; bilateral treaties; nationalization; joint ventures; project financing; transfer of technology; arbitration; investment insurance; unification of the law; and the settlement of investment disputes.

**LAW 672 Mergers and Acquisitions**
Fall. 2 credits. S-U option available.
Pre-requisite: corporations or permission of the instructor. R. F. Balotti.
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 673 Negotiation and Dispute Resolution**
Spring. 2 credits. S-U option available. Limited enrollment. S. Yosem.
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. This course focuses on those processes that permit the highest degree of attorney control: negotiation, mediation, and certain "hybrid" processes such as neutral expert fact finding. The course explores the characteristics of each alternative process as well as the ethical concerns inherent in them, employing not only Socratic dialogue but also interactive and videotape dispute simulations, enabling the student to engage as a negotiator or as a dispute resolution advocate.

**LAW 675 Partnership Taxation**
Spring. 2 credits. S-U option available. R. A. Green.
This course provides an introduction to the taxation of partnerships and limited liability companies. The course focuses on the tax issues arising upon the formation, operation, and liquidation of a partnership or LLC.

**LAW 678 Products Liability**
Spring. 3 credits. S-U option available. J. A. Henderson, Jr.
Applications of products-liability doctrine and theory to a variety of problems drawn from or closely related to product liability litigation. An overview of the relevant case law, statutes, and administrative regulations, including the new Restatement Third of Torts: Products Liability.

**LAW 679 Public International Law**
Fall. 3 credits. S-U option available. D. Wippman.
An introduction to the legal rules governing the conduct of states vis-a-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 of a new order 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 680 Remedies in Litigation**
Fall. 3 credits. S-U option available. E. L. Sherwin.
This course examines the remedial consequences of lawsuits and the remedial choices open to litigants: essential strategic information; strategic choices; the costs of suits; bi-lateral treaties; nationalization; joint ventures; project financing; transfer of technology; arbitration; investment insurance; unification of the law; and the settlement of investment disputes.

**LAW 681 Secured Transactions**
Fall. 2 credits. S-U option available. A. Shapiro.
A study of the law regarding security interests in personal property, primarily Article 9 of the Uniform Commercial Code. Topics include the creation of security interests, the rules for determining priorities among secured creditors and other claimants to property, and creditors' remedies and debtors' rights upon default. We use a practical, problem-oriented approach.

**LAW 682 Securities Regulation**
Spring. 3 credits. Availability of S-U option to be announced at first class. N. C. Howson.
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 1933 Securities Act (33 Act), and the trading of securities in the secondary market governed by the 1934 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 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 concludes with some time to understanding the unique aspects of U.S. regulation of foreign private issuers seeking to raise capital in the United States. Throughout, students also are asked to consider the role and development of the Securities and Exchange Commission (SEC), first authorized under the 34 Act, as a significant actor in the rise of the modern regulatory state.

**LAW 683 Social Security Law**
Spring. 3 credits. S-U option available. 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 Security Act's entitlement, benefit formulae, and procedural rules: highlights those that pose the greatest difficulty to administrators and advocates, and surveys current proposals for change. All of the instruction and discussion takes place on-line.

**LAW 684 Sports Law**
The course traces the development of sports law in the United States. Particular attention is given to the relationships of sports to antitrust and labor law. Contemporary issues involving arbitration, collective bargaining, amateur athletics, agents, franchise movement, and constitutional law are addressed.

**LAW 686 Supervised Teaching**
Fall, spring. 1 or 2 credits. Must be taken S-U. Arrange directly with instructor. See the Law School Registrar.

**LAW 687 Supervised Writing**
Fall, spring. 1, 2, or 3 credits. Must be taken S-U. Arrange directly with instructor. See the Law School Registrar.

**LAW 688 Supervised Teaching and Supervised Writing—Lawyering Program Honors Fellows**
Full year. 4 credits. Must be taken S-U. Prerequisite: application process. Lawyering Program Honors Fellows serve for the full year as teaching assistants in the Lawyering course. With training and guidance from the Lawyering faculty, the Honors Fellows work closely and one-on-one with first-year students on various writing and research projects. In addition to meeting regularly with students and reviewing and critiquing their work, Honors Fellows may help design writing and research assignments, prepare model memoranda, participate in role-playing exercises during mock interviewing or negotiating sessions, judge oral arguments, and assist the librarians with research training. The Honors Fellows are also responsible for teaching and holding classes on the Bluebook. Additionally, Honors Fellows serve as mentors to the entering students to help them make the most of the foundational first year of law school. The Honors Fellows hold workshops on basic law school skills, and during the spring semester, under the direction of the dean of students, a small group of Honors Fellows may tutor first-year law students.

**LAW 689 Taxation of Corporations and Shareholders**
This course examines the federal income taxation of corporate transactions, including incorporations, dividends, reorganizations, liquidations, and reorganizations.

**LAW 692 Trial Advocacy**
This course is devoted to the study of the trial. Fundamental skills are taught in the context of challenging procedural and substantive law problems. Each stage of the trial is examined: jury selection, opening, objections, direct examination, cross-examination, exhibits, impeachment, expert witnesses, child witnesses, summation, and pretrial. In addition to exercises every week on a particular segment of a trial, the student also attends a full day jury trial at the completion of the course. Video equipment is used to teach and critique student performance. There are occasional written assignments, and class attendance is mandatory.

**LAW 694 Trusts and Estates**
Fall. 4 credits. S-U option available.
G. S. Alexander.
The course surveys the basic law of succession to property, including wills and intestate succession and the law of trusts. Among the recurring themes of the course are strict and lenient enforcement of formal requirements and methods of interpretation. This is not a course on estate taxation.

**LAW 698 WTO and International Trade Law**
Spring. 3 credits. S-U option available.
J. J. Barceló III.
The law of the World Trade Organization (WTO), including international trade theory, the basic WTO rules and principles limiting national trade policy, and the WTO dispute settlement process. A study of national (U.S.) fair and unfair trade law within the WTO framework (safeguard, antidumping, subsidies, and countervailing duty remedies). Consideration also is given to nontrade values within the WTO system (environment, labor rights, and human rights).

**PROBLEM COURSES AND SEMINARS**

All problem courses and seminars satisfy the writing requirement. Limited enrollment.

**LAW 700 Advanced Civil Procedure: Issues in International Human Rights Litigation**
Spring. 3 credits. S-U option unavailable.
Limited enrollment. B. J. Holden-Smith.
This seminar explores the development and effectiveness of the mechanisms of domestic courts for the protection and vindication of human rights. We begin with an overview of the American law on authority to adjudicate international cases and enforcement of foreign judgments and arbitration awards. We also treat the approach of other sovereigns, especially European, to such matters. We then explore specific cases involving the litigation of international human rights claims, including the Holocaust victims compensation cases, and the recent movement for reparations for American slavery. Each student is required to undertake a research project on a specific case and make a presentation on the case to the class.

**LAW 703 Advanced Legal Research**
Spring. 3 credits. S-U option unavailable.
Prerequisite: Lawyering. Limited enrollment. P. G. Court, C. M. Germain.
This seminar teaches cutting-edge research techniques to prepare students for practice in the law office of the future. It focuses on desktop electronic legal research and covers U.S., international, and foreign law as well as multidisciplinary research. It is designed to teach students, whose careers will begin in a period of information transition, how to handle traditional and electronic sources and formats and make efficient choices.

**LAW 705 Advanced Persuasive Writing**
Spring. 3 credits. S-U option available.
Limited enrollment. C. Grumbach.
Students master persuasive writing by studying examples of persuasive writing and by writing briefs. In the first part of the course, we read and critique U.S. Supreme Court briefs and other persuasive writings to assess why they work or fail. Students prepare short, critical papers commenting on the writing to be discussed that week. In the second part of the course, students work on individual writing projects such as writing a reply to, or devising a hypothetical amicus brief for, a Brief we critiqued. Students might also substantially rewrite briefs that we critiqued. Students produce multiple drafts of their work and critique and peer-edit their colleagues' work. In both phases of the course, we critique the writings for both content and delivery, looking at some of the devices taught in the first-year lawyering course. We also study each writer's choice of tone, use of syntactical variation, use of imagery and attention to character and plot development. We consider how legal writers tailor their writing for a specific audience and, perhaps, based on opposing counsel's writing style. We determine whether briefs incorporate received wisdom about legal writing and attempt to develop best practices as well as a rule of thumb for when artistic license should trump orthodox legal writing approaches. Finally, we discuss some interesting writing or writing-related questions, such as, Is there a monolithic lawyers' voice? If so, whose voice is it? Does writing as a lawyer compromise or supplant one's true voice or cramp one's style? Does writing as a lawyer leave room for the client's voice? What would the different clients say about the various writers' stories and translations?

**LAW 706 American Legal Theory**
Fall. 3 credits. S-U option available.
Limited enrollment. R. S. Summers.
The fall 2006 topic for this seminar is the well-designed phenomena of legal phenomena such as criteria of valid law (for both publicly and privately made law), institutions such as legislatures and courts, statutory, and other rules, accepted methods of statutory interpretation, the principle of stare decisis and common law rules, adjudicative processes, limitations on judicial power to modify rules, and the formal characteristics of the legal system viewed as a whole. American law is not appropriate form in many important ways, and a heavy price is paid for this. However, well-designed legal form and its distinctive underlying rationales (general legal values) profoundly affect the overall content of practice by lawyers in the American as well as other legal systems. Such formality and its rationale has as much or more of a claim to primacy as the essence of law. "Better than do the public policies that also inform the law's content." In this seminar, there is about equal emphasis on practical skills and theory.

**LAW 708 Appellate Advocacy**
Fall. 3 credits. S-U option available.
This seminar examines the law and skills that are integral to representing a client on appeal. The seminar is loosely divided into three central parts: 1) the principles of appellate law, including standards of review, the preservation doctrine, harmless-error analysis, and remedies; 2) the unique role of appellate counsel, including ethical duties to the court and client; and 3) appellate skills, including client counseling, issue selection, brief writing, and oral argument. Miscellaneous additional topics for potential appellate issues include post-conviction practice, leave applications, and the role of law clerks in the decision-making process. Students read and analyze the record of a criminal proceeding, assess and research potential appellate issues, and prepare a brief (including a rewrite) for either the prosecution or defense. Each student also orally argues the case in a moot-court session.

**LAW 709 Biblical Law**
Spring. 3 credits. S-U option available.
Limited enrollment. C. M. Carmichael.
Analysis of law and narrative in the Bible from the perspectives of social and legal history. Topics include the nature of the law codes (e.g., hypothetical formulation versus statutory law), legal issues in the narratives (e.g., law of adultery and women's rights), law and morality (e.g., the role of consent), law and religion (e.g., institutions guaranteed by the law but condemned by religious authority), the transformation of extralegal relations into legal ones (e.g., with the introduction of money), legal interpretation in antiquity (e.g., the Sermon on the Mount), social factors in legal development (e.g., shame and guilt), and aspects of criminal, family, and private law (e.g., an eye for an eye, incest rules, and unjust enrichment).

**LAW 711 Children at the Intersection of Law and Psychology**
Spring. 3 credits. S-U option available.
This seminar, cross-registered in the Law School and in the Department of Human Development in the College of Human Ecology, is co-taught by a faculty member from each. It is open to second- and third-year law students, human development graduate students, and psychology graduate students. It concentrates on the role of psychologists, particularly family and domestic courts, use psychological and developmental information to reach decisions about children and families. Topics include how fact-finders assess proposed novel theories or syndromes; how children participate in legal decisions affecting them; children's ability to function as eyewitnesses; and other topics the students select.

**LAW 712 China—International Ecological Reform**
Spring. 3 credits. Availability of S-U option to be announced first day of class. Limited enrollment. N. C. Howson.
Only 25 years ago, the People's Republic of China had very limited involvement in world affairs or international institutions and an equally limited domestic legal system. This seminar examines in tandem two apparently separate developments: China's increasing engagement with the international legal order, and the PRC's establishment of a viable domestic legal regime to serve a developing "Socialist market economy." The aim of
the seminar is to explore the relationship and intersection between these two very significant developments for China and the world by focusing on the theory and reality of China’s involvement in various aspects of the international legal order—public and private—and the stabilization of domestic legal norms and institutions. Topics addressed in detail include the relationship of the PRC to the international order (whether as “status quo” or revolutionary power), China’s approach and interaction with public international law and institutions, the aims and effects of China’s accession to the WTO, the history of China’s reception of foreign direct investment and the specific legal regime established for it, China’s experience with infectious disease threats (SARS and AIDS), and China’s global and domestic environmental law and policy.

**LAW 716 Comparative Corporate Law**

Fall. 3 credits. Availability of S-U option announced first day of class. Limited enrollment. J. C. Dammann. This seminar concentrates on the primary similarities and differences between U.S. corporate law and European corporate law regimes, particularly the German one. The aim is to provide students with a better understanding of U.S. corporate law and to prepare them for work involving foreign corporate law. The seminar begins by focusing on the relationship between a country’s corporate law regime and the legal and institutional framework in which that corporate law regime functions. Topics dealt with include the role of federal/community law, the weight attached to precedents, the structure of the judiciary, the role of capital markets, and the influence of the rules on corporate taxation. We then return to the issues of interest of managers and shareholders, the protection of minority shareholders, the protection of creditors, the law governing corporate groups, and the role of employees in the management of corporations.

**LAW 722 Ethical Issues in Criminal Practice**

Fall. 3 credits. S-U option available. Satisfies the professional responsibility requirement. Limited enrollment. C. Grumbach. Using simulated problems, we explore the ethical duties of and practical quandaries faced by prosecutors and criminal defense attorneys. As some examples, we examine the ethical duties that pertain to the examination of witnesses and argument to the jury, the duty of the prosecutor to seek justice, not merely to convict, the relationship of the prosecutor to witnesses and police; the prosecutor’s obligation to disclose exculpatory evidence; the duties and director of a defense attorney confronted with a guilty client who intends to commit perjury or an innocent client who wishes to accept a plea offer; and the right to effective assistance of counsel. We review these topics in the context of hypothetical and famous trials that involve issues such as coaching, playing the race card, and blaming the victim, or arrests based on racial profiling or planted evidence. The writing assignments are to be in the form of persuasive trial memoranda prepared on behalf of or to prosecute simulated clients. Sample issues might involve attorneys who face quandaries such as what to do with the smoking gun that a client has just delivered to the law office or whether to inform the judge that a defendant is using an alias to hide a substantial criminal record. At the end of the semester we hold mock hearings based upon these simulated cases.

**LAW 723 Ethnoricacial Identity in Anthropology, Language, and Law (also ANTHRO 624)**

Spring. 3 credits. S-U option available. Limited enrollment. V. Santiago-Irizarry. This seminar examines the role that both law and language, as mutually constitutive, mediating systems, occupy in constructing ethnoricacial identity in the United States. We approach the law from a critical anthropological perspective, as a signifying and significant system rather than as an abstract collection 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 724 Comparative Law**

Fall. 3 credits. Availability of S-U option announced first day of class. Limited enrollment. R. Graycar. This seminar examines the role of law, and more generally, the role of the state, in perpetuating and remedying inequities against women. We study several paradigmatic feminist legal theories, including equality, difference, dominance, and various anti-essentialist theories (e.g., intersectional, poststructuralist). Among the questions considered are: How does the law help to construct gender? In what ways does it interact with cultural images and assumptions regarding women to perpetuate women’s disadvantaged status in society? To what extent can a set of institutions implicated in women’s marginalization be used to remedy it? Can a legal system predicated on the liberal assumption of a unitary, prepolitical, autonomous self accommodate feminist accounts of social construction, constrained choice, or decentered subjects? What methods do feminists used to argue in and about the law, and do these methods themselves have the potential to transform legal thinking?

**LAW 725 Global and Regional Economic Integration: The WTO, EU, and NAFTA**

Spring. 3 credits. S-U option available. Limited enrollment. J. J. Barcelo 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 law governing that regime, the direct effect and supremacy of EU law, and the development of the four freedoms (goods, services, persons, and capital). A basic introduction to NAFTA is also included. Student seminar papers may deal with issues arising within any of the three regimes. Comparative studies are encouraged.

**LAW 728 First Amendment Theory**

Spring. 3 credits. S-U option available. Limited enrollment. S. H. Shiffman. 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, free speech, self-government, public morality, dissent, and antidiscrimination; the relationship of various conceptions of democracy to freedom of the press; and various conceptions regarding the optimal relationship between church and state. Among the more specific topics at issue, 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 729 Habeas Corpus**

Fall. 3 credits. S-U option available. Limited enrollment. T. W. Morrison. This seminar examines habeas corpus, sometimes called the "great writ of liberty," from three perspectives. First, we consider...
the origins and development of habeas in English and American legal history. Second, we consider the contemporary role of habeas in providing federal judicial review of executive detention, especially in immigration cases and post-9/11 cases involving alleged "enemy combatants." Third, we consider the contemporary role of habeas in providing federal judicial review of state criminal convictions, especially in capital cases. The second and third parts of the seminar are an opportunity to think about specific habeas-related issues against the backdrop of broader constitutional principles of separation of powers and federalism.

LAW 731 Immigration and Refugee Law
Fall. 3 credits. S-U option unavailable. Prerequisite: Constitutional Law. Limited enrollment. J. Wiener.

This course explores the evolving relationship between U.S. immigration policy and our national purposes. Immigration plays a central role in contemporary American life, significantly affecting our foreign relations, human rights posture, ethnic group relations, labor market conditions, welfare programs, public services, and domestic politics. It also raises in acute form some of the most basic problems that our legal system must address, including the rights of individuals, minorities, the concepts of nationhood and sovereignty, fair treatment of competing claimants for scarce resources, the imperatives of mass administrative justice, and pervasive discrimination. In approaching these questions, the course draws on diverse historical, judicial, administrative, and policy materials.

LAW 732 International Criminal Law

This seminar examines the questions surrounding international criminal law as a separate discipline and the sources of and basic principles underlying the subject. Particular attention is paid to the question of jurisdiction over international crimes. It considers international crimes such as aggression, war crimes, crimes against humanity, terrorism, and torture. It also considers the treatment of past human rights violations in post-invasion situations. It further considers procedural aspects of international criminal law and the forums that deal with international crimes. In that context, it looks at the structure, jurisdiction, and jurisprudence of truth commissions, the International Criminal Court (the Rome Statute); the former Yugoslavia Tribunal; the Rwanda Tribunal; and extradition and mutual legal assistance. The format includes class discussions of assigned readings from the course readings. The course is based on participation in class discussions and a written paper on a subject falling within the themes of the seminar. The seminar addresses basic issues such as codification, legal reform, and law. Seminar discourses are based largely on primary sources in English translation.

LAW 733 Japanese Law
Fall. 3 credits. S-U option unavailable. Limited enrollment. A. Riles.

This seminar explores topics in Japanese law from a socio-legal perspective. Topics include Japanese constitutional law, financial regulation, contract law, and relations among the bureaucracy, the courts, the legal academy, and private parties in the making and interpretation of law. Students write a seminar paper of 20 to 30 pages and present the paper for discussion in the seminar. Thoughtful class participation is an important criterion in final evaluations.

LAW 754 Law and Violence against Women
Spring. 3 credits. S-U option unavailable. Limited enrollment. F. A. Sussman.

This seminar examines violence against women from both theoretical and practical perspectives. The seminar begins with a general introduction to various feminist theories, including equality feminism, difference feminism, anti-essentialism, and post-modern feminism. We examine these feminist theories to provide frameworks for analyzing concrete manifestations of violence against women. The seminar examines the role of domestic and intimate violence, rape, sexual harassment, pornography, and prostitution. The seminar seeks to apply theories to practice and use the issues that arise in legal practice to further clarify the definitions of violence, and justice. In both theory and practice, students collectively work toward developing legal strategies for contesting violence against women. This seminar encourages students to critique existing frameworks and assume the role of social movement lawyers.

LAW 756 Legal Aspects of Commercial Real Estate Development
Spring. 3 credits. S-U option available. Limited enrollment. J. E. Blyth.

Through the use of several written memoranda and oral presentations, this seminar addresses basic to commercial real estate development. The seminar focuses on purchase agreements, options of refusal, and memorandum thereof; representations and warranties; disclosure required of brokers and sellers; attorneys as brokers; notarial misconduct; conveyancing and surveys; commercial leases; conventional financing; conflicts between commercial tenants and institutional lenders; alternatives to conventional financing; title insurance; attorney opinion letters; and choice of real estate entity. About half of the semester is devoted to commercial leases, conventional financing, and alternatives to conventional financing (such as tax-exempt financing, mezzanine financing, and synthetic leases).

LAW 757 Legal Narratives
Fall. 3 credits. S-U option available. Limited enrollment. E. L. Sherwin.

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 selects a case and prepares and presents his or her own case history, working from briefs, related legal materials, secondary sources, and, if possible, contacts with lawyers and parties. Grades are based on papers and presentations.

LAW 758 Making the Punishment Fit the Crime
Spring. 3 credits. S-U option available. Limited enrollment. S. Garvey.

This seminar begins with an investigation into the moral psychology of wrongdoing and how and why it is punished. This seminar explores the dynamic tensions, high expectations, and complex issues universities and colleges face in fulfilling their mission.

LAW 735 International Humanitarian Law
Fall. 3 credits. S-U option available. Limited enrollment. D. Wippman.

This seminar examines the principles and rules governing the conduct of international and noninternational armed conflicts; an area of law also known as the law of war or the law of armed conflict. We study the 1949 Geneva Conventions and their 1977 Additional Protocols as well as case law from Nuremberg to the present. We consider the evolution of restraints on the means and methods of warfare, the distinction between combatants and noncombatants, the treatment of prisoners of war, the definition of military objectives and the rules governing targeting decisions (including "injured combatant killings"), the concept of proportionality and its utility in war, the law of occupation, and the temporal and geographic scope of armed conflicts. Particular attention is paid to the problems posed for humanitarian law by international terrorism and responses to it, including the treatment of "unlawful combatants" and the construction of Israel's separation barrier.

LAW 736 Introduction to French Law
Fall. 3 credits. S-U option unavailable. Not available to students with significant knowledge of civil law system. Limited enrollment. C. Germain.

This course introduces the student to the French legal system from a comparative law perspective, with a focus on civil law methodology and French legal institutions. Topics studied include French law sources such as legislation and court decisions, and scholarly writings; the relationship between French law and the European Union; the French court structure in civil, criminal, and administrative law matters and its major procedural features; and the organization of the legal profession.

LAW 737 Introduction to Islamic Law

This seminar is designed to introduce law students to the terminology, principles, and concepts of Islamic law. In part one, we examine the structure of Islamic law and the development of its principles of jurisprudence. In part two, we analyze court cases that took place in Morocco and Spain between 1300 and 1500, with special attention to judicial procedure, personal status law, property law, and penal law. In part three, we examine the modern transformation of Islamic law by focusing on the example of Egypt, addressing issues such as codification, legal reform, international law. Seminar discussions are based largely on primary sources in English translation.

LAW 738 Legal Aspects of Commercial Financing
Spring. 3 credits. S-U option available. Limited enrollment. J. E. Blyth.

This seminar introduces students to the terminology, principles, and major procedural features of Islamic law and its major procedural features; and the organization of the legal profession.

LAW 739 Japanese Law
Fall. 3 credits. S-U option unavailable. Limited enrollment. A. Riles.

This seminar explores topics in Japanese law from a socio-legal perspective. Topics include Japanese constitutional law, financial regulation, contract law, and relations among the bureaucracy, the courts, the legal academy, and private parties in the making and interpretation of law. Students write a seminar paper of 20 to 30 pages and present the paper for discussion in the seminar. Thoughtful class participation is an important criterion in final evaluations.

LAW 741 Law and Higher Education
Spring. 3 credits. S-U option available. Limited enrollment. J. E. Blyth.

This seminar examines the complex issues that arise in legal practice to further clarify the definitions of violence, and justice. In both theory and practice, students collectively work toward developing legal strategies for contesting violence against women. This seminar encourages students to critique existing frameworks and assume the role of social movement lawyers.

LAW 742 Law and Violence against Women
Spring. 3 credits. S-U option available. Limited enrollment. F. A. Sussman.

This seminar examines violence against women from both theoretical and practical perspectives. The seminar begins with a general introduction to various feminist theories, including equality feminism, difference feminism, anti-essentialism, and post-modern feminism. We examine these feminist theories to provide frameworks for analyzing concrete manifestations of violence against women. The seminar examines the role of domestic and intimate violence, rape, sexual harassment, pornography, and prostitution. The seminar seeks to apply theories to practice and use the issues that arise in legal practice to further clarify the definitions of violence, and justice. In both theory and practice, students collectively work toward developing legal strategies for contesting violence against women. This seminar encourages students to critique existing frameworks and assume the role of social movement lawyers.

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Spring. 3 credits. S-U option available. Limited enrollment. F. A. Sussman.

This seminar examines violence against women from both theoretical and practical perspectives. The seminar begins with a general introduction to various feminist theories, including equality feminism, difference feminism, anti-essentialism, and post-modernism. We examine these feminist theories to provide frameworks for analyzing concrete manifestations of violence against women. The seminar examines the role of domestic and intimate violence, rape, sexual harassment, pornography, and prostitution. The seminar seeks to apply theories to practice and use the issues that arise in legal practice to further clarify the definitions of violence, and justice. In both theory and practice, students collectively work toward developing legal strategies for contesting violence against women. This seminar encourages students to critique existing frameworks and assume the role of social movement lawyers.

LAW 755 Legal Aspects of Commercial Real Estate Development
Spring. 3 credits. S-U option available. Limited enrollment. J. E. Blyth.

This seminar addresses basic to commercial real estate development. The seminar focuses on purchase agreements, options of refusal, and memorandum thereof; representations and warranties; disclosure required of brokers and sellers; attorneys as brokers; notarial misconduct; conveyancing and surveys; commercial leases; conventional financing; conflicts between commercial tenants and institutional lenders; alternatives to conventional financing; title insurance; attorney opinion letters; and choice of real estate entity. About half of the semester is devoted to commercial leases, conventional financing, and alternatives to conventional financing (such as tax-exempt financing, mezzanine financing, and synthetic leases).

LAW 757 Legal Narratives
Fall. 3 credits. S-U option available. Limited enrollment. E. L. Sherwin.

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 selects a case and prepares and presents his or her own case history, working from briefs, related legal materials, secondary sources, and, if possible, contacts with lawyers and parties. Grades are based on papers and presentations.
that investigation and apply them to various issues and controversies arising within the substantive criminal law. In this connection we examine among other topics the defense of provocation (heat of passion), depraved heart murder, negligent homicide, duress, hate crimes, and imperfect self-defense. We also ask whether and how an offender’s punishment should depend on the fact that his or her conduct actually resulted in harm (or whether it should depend only on what happened to cause or risk causing), and whether an offender’s punishment should depend on the motives with which he or she commits the crime (or more generally, whether it should depend on his or her character).

**LAW 760 Organized-Crime Control**
Fall. 3 credits. S-U option available. Limited enrollment. J. C. Goldstock.
This seminar explores the challenges organized crime poses 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 the grand jury. The RICO statute is explored in detail as well as a variety of noncriminal remedies, including forfeiture and court- imposed trusteeships.

**LAW 764 Problems in Advanced Torts**
Students have an opportunity to write a paper on a topic of their choosing from the law of torts. Topics not typically covered in the first-year torts course are preferable, including (but not limited to) products liability, business torts, environmental torts, and defamation. Papers should be of publishable quality and maximum length of 30 pages. Early meetings are devoted to discussions of background topics—e.g., economic analysis of tort law, fairness-based theories, and the like—and to the preparation of written summaries. Later meetings give each student an opportunity to present his/her work to the group.

**LAW 768 The Religion Clauses of the First Amendment**
Fall. 3 credits. S-U option unavailable. Limited enrollment. G. J. Simon.
This seminar examines various issues relating to the First Amendment’s Establishment and Free Exercise Clauses. In the first half of the semester the seminar meets to discuss assigned readings. The second half is devoted to the presentation of seminar papers. Each student must submit a substantial paper on an approved topic and brief written critiques of two other students’ papers.

**LAW 774 Separation of Powers**
3 credits. S-U option unavailable. Prerequisite: Constitutional Law and Administrative Law. Students without such background should consult with the instructor. Limited enrollment. C. F. Farina.
In the last twenty years we have witnessed more debate about the nature and consequences of “separation of powers” than we have since our founding era. This seminar examines the ways 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 778 Theories of Property**
Fall. 3 credits. Availability of S-U option to be announced the first day of class. Prerequisite: Property. Limited enrollment. G. S. Alexander.
This seminar explores the various ways that people have conceived of, or understood property. The materials studied are eclectic and interdisciplinary. They include readings on commonness, commodification, and women and property as well as the classical justifications for private property (libertarian, utilitarian, etc.).

**CLINICAL COURSES AND EXTERNSHIPS**
All clinical courses and externships have limited enrollment.

**LAW 780 Asylum and Convention against Torture Appellate Clinic**
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 have represented themselves pro se in Immigration Court. During the first part of the semester students 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 do not entail in-depth 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 communicate with clients during this time, although 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 provide a basis for more in-depth substantive learning as well as practical skills and attorney-client issues. In class, each team also discusses the legal and practice issues that arise in their case, so that all students can benefit from and assist with each individual case.

**LAW 781 Capital Punishment Clinic: Post-Conviction Litigation**
Spring. 4 credits. S-U option available. Prerequisite: permission of instructor. Criminal Procedure or criminal law experience preferred. Limited enrollment. J. H. Blume, S. L. Johnson.

Death penalty post-conviction litigation: investigation and the preparation of petitions, memoranda, and briefs. This course is taught as a clinic. Two or possibly three South Carolina death row cases are worked on by students. Case selection depends on both pedagogical factors and litigation needs of the inmates. Students read the record and research legal issues. Some students are involved in investigation, while others assist in the preparation of papers. All students are included in discussions regarding the necessary investigation and strategy for the cases.

**LAW 782 Capital Trial Clinic I and II**
Spring. 4 credits. S-U option available. Prerequisite: permission of the instructor. Criminal Procedure or criminal law experience preferred. Limited enrollment. J. H. Blume, S. L. Johnson.

Students aid in the representation of a defendant charged with a capital crime. This clinic focuses on pretrial and fact investigation, while the latter half is devoted to 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 made each spring semester to work with defense attorneys, mental health professionals, and witnesses to prepare for trial. All students are kept abreast of the developments in the case and included in discussions of strategy as they arise.

**LAW 783 Full-Term Externship**

The Full-Term Externship course allows students to earn 12 credit hours as externs working full-time a minimum of 65 days at an approved nonprofit or governmental placement site off-campus during the fall semester of their third year. After a careful review of the complete course description found in the Registrar’s Office and attending a mandatory meeting introducing the course, students must make written application for the course in the spring semester preceding their externship. The application includes, among other things, a description of the placement and the activities that the extern expects to perform, a statement of the extern’s educational and career goals, and an explanation of how those goals are better met at the placement than at the Law School. The instructors, in collaboration with the associate dean for academic affairs, reviews the applications and decides whether each applicant should be granted conditional approval. For students to receive final approval, the placement site must accept the student for the placement and meet specified criteria, including identification of an attorney at the placement who will closely supervise and mentor the extern. In addition to his or her work responsibilities for the placement, the extern prepares weekly journal entries for the faculty supervisor, engages in regular pedagogical factors and litigation needs of the cases. Students read the record and research legal issues. Some students are involved in investigation, while others assist in the preparation of papers. All students are included in discussions regarding the necessary investigation and strategy for the cases.

**LAW 784 Government Benefits Clinic 1 or 3**
Spring. 6 credits. S-U option available. Limited enrollment. B. Strom.
This course has two classroom components: the Government Benefits Clinic class and the Clinical Skills 1 or Clinical Skills 3 class. The course has a substantive component, in which a broad conceptual understanding of a complex and controversial area of law and public policy is developed, and a
real-life clinical experience, in which those concepts can be applied in solving actual client problems. The substantive component provides an introduction to government benefits law by examining various social insurance and need-based benefit programs including Unemployment Insurance, Temporary Assistance to Needy Families (TANF), Supplemental Security Income (SSI), Medicaid, and Food Stamps. Case handling involves the representation of clients in government benefits cases involving the Tompkins County Department of Social Services, the N.Y.S. Department of Labor, and the Social Security Administration. The course also includes Clinical Skills 1 or Clinical Skills 3. Clinical Skills 1 class addresses interviewing, counseling, negotiation, and advocacy skills through the use of readings, videotapes, discussions, demonstrations, and simulation exercises. Clinical Skills 3 class builds on the skills taught in Clinical Skills 1 and addresses such topics as alternative dispute resolution, formal discovery, and motion argument.

**LAW 785 Government Benefits Clinic/Neighborhood Legal Services Externship 1 or 2**  
Spring, 6 credits. S-U option available. Limited enrollment. B. Strom.  
This course is a combination of Government Benefits Clinic and the Neighborhood Legal Services Externship and either Clinical Skills 1 or Clinical Skills 3. The course is the same as Government Benefits Clinic except that the case-handling component involves handling cases for the Ithaca Office of Neighborhood Legal Services. See the descriptions for the Government Benefits Clinic and the Neighborhood Legal Services Externship for additional details.

**LAW 786 Judicial Externship**  
Fall, spring. 4 credits. S-U option available.  
Students work with a trial court judge. Work involves courtroom observation, conferences with the judge, research, and drafting memoranda and legal memoranda. The emphasis is on learning about judges, the judicial decision-making process, and trials. There are weekly class meetings with readings and discussions of topics related to the judicial process. The primary focus is the student's work at the placement, each student will also do case presentations and weekly journal entries, provide written work samples, and meet individually with the faculty member.

**LAW 788 Law Guardian Externship**  
Fall, spring. 3 credits. S-U option available. Limited enrollment. J. M. Miner.  
Students learn about the representation of children in abuse and neglect cases, juvenile delinquency proceedings, and PINS (persons in need of supervision) cases through their placement at the Tompkins County Law Guardian office. Duties may include interviewing, investigation, drafting memoranda and motions, and assisting in trial preparation. There are several meetings with the instructor during the semester for discussion of issues arising from and related to the representation of children. Biweekly journals are also required.

**LAW 790 Legislative Externship**  
Fall, spring. 3 credits. Limited to two students each semester, selected by Assemblywoman Barbara Lifton. B. Strom.  
The students work with Assemblywoman Lifton. Work involves drafting legislation, tracking legislation for constituents, legal research and writing, and responding to constituent requests that particularly require legal research or an explanation of law. The emphasis is on their power and practical limits on their influence in the legislative process, drafting of legislation, the reasons for statutory ambiguity, and various learning skills. The course includes informal meetings with the faculty supervisor during the semester, with readings and group discussions related to the externship experience.

**LAW 791 Neighborhood Legal Services Externship 1 or 2**  
Fall, spring. 4 credits. S-U option available. Limited enrollment. B. Strom.  
Classroom component is provided by Clinical Skills 1, 2 (fall), or 3 (spring), depending on whether the student has previously been enrolled in a course in which Clinical Skills 1 was a component. Cases involve the representation of clients of the Ithaca office of Neighborhood Legal Services (NEL). Along with case handling, this externship includes a classroom component, provided by Clinical Skills 1, 2 or 1, 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 meets periodically with the faculty supervisor for review of the placement experience.

**LAW 793 Public Interest Clinic 1**  
Fall, spring. 4 credits. S-U option available. Limited enrollment. E. M. McCormick, B. Strom.  
Students handle civil cases for low-income clients of the Public Interest Clinic under the supervision of the clinic faculty. Students interview and counsel, investigate and analyze facts, draft substantive and procedural law with facts in the context of actual representation; develop a strategy to handle clients' problems; identify and resolve professional responsibility issues; develop legal writing; negotiate and settle cases; and represent clients at administrative hearings. The classroom component is provided by the Clinical Skills 1 class, in which students develop interview, counseling, negotiation, and advocacy skills through the use of readings, videotapes, demonstrations, and simulation exercises. Note: During the second or third week there may be an additional class session. Classes are mandatory.

**LAW 793 Public Interest Clinic 2**  
Fall, spring. 4 credits. S-U option available. Prerequisite: Public Interest Clinic 1 or a clinic course that included the Clinical Skills 1 classroom component. Limited enrollment. E. M. McCormick, B. Strom.  
Students handle Public Interest Clinic 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. The classroom component, Clinical Skills 2 builds on the skills taught in Clinical Skills 1 and may address such skills as fact investigation and analysis, pre-trial activities, and drafting. Students represent the clinic's clients in both federal and state courts.

**LAW 793 Public Interest Clinic 3**  
Spring, 4 credits. S-U option available. Prerequisite: Public Interest Clinic 1 or a clinic course that included the Clinical Skills 1 classroom component. Limited enrollment. E. M. McCormick, B. Strom.  
Students handle Public Interest Clinic 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. The classroom component, Clinical Skills 3 builds on the skills taught in Clinical Skills 1 and 2 and may address such issues as alternative dispute resolution, formal recovery, and motion practice. Students represent the clinic's clients in both federal and state courts.

**LAW 797 Women and the Law Clinic 1 or 3**  
Spring, 6 credits. S-U option available. Limited enrollment J. M. Miner.  
This course has two classroom components: Women and the Law Clinic class and Clinical Skills 1 or Clinical Skills 3. Class meets periodically with the faculty supervisor during the semester, with readings and group discussions related to the externship experience. The course includes classroom component that included the Clinical Skills 1 class and associated with: The Women and the Law Clinic class and Clinical Skills 3. Clinical Skills 1 addresses interviewing, counseling, negotiation, and advocacy skills through the use of readings, videotapes, discussions, demonstrations, and simulation exercises. Clinical Skills 3 builds on the skills taught in Clinical Skills 1.

**NONPROFESSIONAL COURSES—NOT OPEN TO LAW STUDENTS**

**GOVT 313 The Nature, Functions, and Limits of Law**  
Spring. 4 credits. S-U option unavailable. Undergraduates only. K. M. Clermont.  
A 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 techniques for resolving conflicts and conflicts with social processes. The course analyzes the roles of courts, legislatures, and administrative agencies in the legal process, considering also constitutional limits on their power and practical limits on their effectiveness. Assigned readings consist mainly of judicial and administrative decisions, statutes and rules, and commentaries on the legal process.

**LAW 405 The Death Penalty in America**  
Spring. 3 credits. J. H. Blume, 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 will lead discussion sections.

**LAW 410 Limits on and Protection of Creative Expression—Copyright Law and Its Close Neighbors**

Fall. 4 credits. S.U. option available. Non-law students only. P. W. Martin. This course provides an introduction to copyright law and closely related legal regimes for non-law students. A significant portion of the instruction and discussion is on-line. Copyright law has become increasingly important as the United States has shifted from a predominantly manufacturing economy to an information economy, with such products as software, recorded music, movies, and TV assuming major importance as exports, and digital distribution exploding. This course provides an overview of U.S. copyright law and the relationship between copyright and contractual license, trademark, patent, and the “right of publicity” as these other regimes relate to information products. The survey begins with the substantive and procedural requirements that surround copyright protection. It proceeds to survey the rights granted copyright holders and important limits on those rights such as “fair use.” How infringement is established, what remedies are available, and other important features of copyright litigation are covered. Issues raised by new information technologies and recent amendments addressing them receive special attention. Finally, because of the growing importance of the global market for copyright-protected products, the international copyright system is also addressed.

**FACULTY ROSTER**

Alexander, Gregory S., J.D., Northwestern U. A. Robert Noll Prof.
Barcelo, John J. III, S.J.D., Harvard U. William Nelson Cromwell Professor of International and Comparative Law
Blume, John H., J.D., Yale U. Assoc. Prof. of Law
Burk, Dan L., J.S.M., Stanford U. Visiting Prof. of Law
Clermont, Kevin M., J.D., Harvard U. James and Mark Flanagan Professor of Law
Clymer, Steven D., J.D., Cornell U. Prof. of Law
Dannmann, Jens C., J.S.D., Yale U. Visiting Asst. Prof.
Eisenberg, Theodore, J.D., U. of Pennsylvania. Henry Allen Mark Professor of Law
Farina, Cynthia R., J.D., Boston U. Prof. of Law
Fineman, Martha A., J.D., U. of Chicago. Prof.
Finger, Charles S., J.D., SUNY Buffalo. Collection Development/Reference Librarian
Gallagher, Claire M., LL.B., C.U. Paris. Edward Cornell Law Librarian and Professor of Law
Garvey, Stephen F., J.D., U. of Virginia. Prof. of Law
Germain, Claire M., LL.B., U. of Paris. Edward Cornell Law Librarian and Professor of Law
Goldman, Cheryl M., J.D., Cornell U. Reference Librarian
Hay, George A., Ph.D., Northwestern U. Edward Cornell Professor of Law and Professor of Economics in the College of Arts and Sciences
Heise, Michael, Ph.D., Northwestern U. Prof.
Henderson, James L., J.D., LL.M., Harvard U. Frank B. Ingersoll Professor of Law
Hillman, Robert A., J.D., Cornell U. Edwin H. Woodruff Professor of Law
Hockett, Robert C., J.S.D., Yale U. Asst. Prof.
Hohenstein, Barbara J., J.D., U. of Chicago. Prof.
Howson, Nicholas C., J.D., Columbia U. Visiting Asst. Prof.
Johnson, Sheri L., J.D., Yale U. Prof.
Kahn, Lily L.M., New York U. Visiting Asst. Prof.
Lasser, Mitchell, Ph.D., Yale U. Prof.
Lehman, Jeffrey S., J.D., U. of Michigan. Prof.
Martin, Peter W., LL.B., Harvard U. Jane M. G. Foster Professor of Law
Meyler, Bernadette A., Ph.D., U. of California. Davis. Assst. Prof.
Morrison, Trevor W., J.D., Columbia U. Asst. Prof.
Ndolo, Muna B., Ph.D., Trinity C. Prof.
Pacheco, Jeffery J., Ph.D., Stanford U. Prof.
Ritos, Annemarie D., Ph.D., U. of Cambridge. Prof. and Prof. of Anthropology in the College of Arts and Sciences
Rossi, Fausto F., J.D., Cornell U. Samuel Leibowitz Professor of Trial Techniques
Schwab, Stewart J., Ph.D., U. of Michigan. Prof.
Sherwin, Emily L., J.D., Boston U. Prof.
Shiffrin, Steven H., J.D., Loyola U. of Los Angeles. Prof.
Siliciano, John A., J.D., Columbia U. Vice Provost and Prof.
Sisson, Gary, J.D., Yale U. Prof.
Stone, Katherine V. W., J.D., Harvard U. Prof. and Anne Evans Fishbrook Prof. in Dispute Resolution in the School of Industrial and Labor Relations
Summers, Robert S., LL.B., Harvard U. William G. Roberts Professor in Administration of the Law
Taylor, Winnie F., LL.M., U. of Wisconsin. Prof.
Wendel, W. Bradley, J.S.D., Columbia U. Assoc. Prof.
Wipman, David J., Yale U. Prof.

**Legal Aid Clinic**

Gallbreath, Glenn G., J.D., Case Western Reserve U. Senior Lecturer
McCracken, Elizabeth M., J.D., Georgetown U., Visiting Lecturer
Miner, JoAnne M., J.D., U. of Connecticut. Senior Lecturer and Director
Stock, Barry J., J.D., Cornell U. Senior Lecturer

**The Lawyering Program**

Anderson, Paige S., J.D., Cornell U. Senior Lecturer
Atlas, Joel, J.D., Boston U. Senior Lecturer
Bond, Cynthia D., J.D., Cornell U. Lecturer
Davis, Tammy A., J.D., Cornell U. Visiting Lecturer
Grumbach, Carol J., J.D., Cornell U. Director of Lawyering Program and Senior Lecturer
Kurz, Leslie J., J.D., U. of California. Davis. Visiting Lecturer
Mckee, Estelle M., J.D., Columbia U. Lecturer
Mooney, Andrea J., J.D., Cornell U. Lecturer

**Academic Library Staff**

Callihan, Jean M., J.D. Pennsylvania State U. Head of Reference Services
Court, Patricia G., J.D. Hamline U. Asst. Director for Administration and Public Services
Finger, Charles S., J.D., SUNY Buffalo. Collection Development/Reference Librarian
Germain, Claire M., LL.B., U. of Paris. Edward Cornell Law Librarian and Professor of Law
Gillespie, Janet M., M.S., Cornell U. Administrative Supervisor/Access Service
Jones, Julie M., J.D., Northwestern U. Reference Librarian
Mills, Thomas J., J.D., U. of Illinois Urbana-Champaign. Reference Librarian
Morris, Matthew J., J.D., Mercer U. Reference Librarian
Pajerek, Jean M., M.L.S., SUNY-Albany. Head of Technical Services

**Members of Other Faculties Associated with the Law School**

Carmichael, Calum M., B. Litt., Oxford U. Prof. in the College of Arts and Sciences
Haapakoski, James J., Ph.D., U. of Virginia. Prof. in the College of Human Ecology
Lieb fertilizer, Lisa L., J.D., U. of Florida. Assoc. Prof. in the College of Industrial and Labor Relations
Pierce, David S., Ph.D. Princeton U. Prof. in the College of Arts and Sciences
Santiago-Inzunza, Vilma, Ph.D., New York U. Assoc. Prof. in the College of Arts and Sciences
Shulman, Zachary, J.D., Cornell U. Thomas Clark Senior Lecturer of Entrepreneurship in the Johnson Graduate School of Management
Wells, Martin T., Ph.D., U. of California. Prof. in the School of Industrial and Labor Relations

**Adjunct Faculty Members**

Balogh, R. Franklin, LL.B., Cornell U. Adjunct Prof.
Berestof, H. Richard, M.D., U. of Colorado. Adjunct Prof.
Blumkin, Joy A., J.D., Emory U. Adjunct Prof.
Blyth, John E., Dr. jur., Goethe U. Adjunct Prof.
Brennen, Lorraine M., J.D., Suffolk U. Adjunct Prof.
Briggs, W. Buckley, J.D., Georgetown U. Adjunct Prof.
Goldstein, Stephen J., U. of Pennsylvania. Adjunct Prof.
Goldstock, Ronald G., J.D., Harvard U. Adjunct Prof.
Greenberg, Marcia E., J.D., Northwestern U. Adjunct Prof.
Hannah White, Cynthia, J.D., Cornell U. Adjunct Prof.
Mingle, James J., J.D., U. of Virginia. Adjunct Prof.
Nelson, Patricia S., J.D., Cornell U. Adjunct Prof.
Sanchez, Robert A., J.D., Indiana U. Bloomington. Adjunct Prof.
Shapiro, Amy J., Harvard U. Adjunct Prof.
Shaw, Anthony W., J.D., Georgetown U. Adjunct Prof.
St. Landau, Norm D., J.D., Antioch C. Adjunct Prof.
Suagee, Dean B., LL.M., American U. Adjunct Prof.
Sussman, Erika J., J.D., Cornell U. Adjunct Prof.
Warth, Patricia J., J.D., Cornell U. Adjunct Prof.
Yale-Lochr, Stephen W., J.D., Cornell U. Adjunct Prof.
Yusem, Stephen G., J.D., U. of Pennsylvania. Adjunct Prof.
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. The faculty 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 through the College of Human Ecology. An undergraduate program, Nutrition, Food, and Agriculture, is offered in the College of Agriculture and Life Sciences. 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 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 also has a graduate reading room.

UNDERGRADUATE PROGRAMS

The Division of Nutritional Sciences offers three programs leading to a B.S. degree:

Nutritional Sciences (NS), 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.

Nutrition, Food, and Agriculture (NEA), College of Agriculture and Life Sciences: this program is for students who want strong training in human nutrition combined with supportive coursework in agriculture and the life sciences. Strong preparation in biology, chemistry, and math is required. Students in the Nutrition, Food, and Agriculture program supplement the nutrition curriculum with courses in areas such as food science, animal science, plant science, advanced biology, business and economics, education, and communication.

Human Biology, Health, and Society (HBHS), College of Human Ecology: established in 1997, this program gives students a strong foundation in biology. It then goes on to explore human health issues from the perspectives of both biology and the social sciences. Students complete a rigorous curriculum in the natural sciences and then, choosing from a wide array of courses offered in the College of Human Ecology, focus their studies on health issues of their choice. Students can explore such topics as gene expression and metabolism related to disease states, biological and social aspects of growth and development, and policies and programs influencing health.

The division also offers the Program of Study in Human Nutrition for biological sciences majors who may be enrolled in the College of Agriculture and Life Sciences or College of Arts and Sciences. The Program of Study in Human Nutrition offers biology majors a course in 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. They 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 advisers 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.

The NS, NFA, and HBHS programs all require a rigorous sequence of courses in chemistry and biology, including introductory chemistry and biology, organic chemistry, biochemistry, and physiology. A minimum competency in college algebra is required with an additional math and/or statistics requirement for some programs and career paths. Students in the HBHS major also complete a course in physics and two additional courses in advanced biology.

All students complete the introductory course Nutrition, Health, and Society (NS 115). The NS and NFA programs require the completion of four other core courses: Social Science Perspectives on Food and Nutrition (NS 245); Nutritional and Physicochemical Aspects of Foods (NS 345); Physiological and Biochemical Bases of Nutrition (NS 331); and Methods in Nutritional Sciences (NS 332). Students in these programs also must select a minimum of nine credits in advanced courses in the nutritional sciences.

The HBHS major requires a minimum of six credits from courses that integrate biology and the social sciences as they examine health issues. In addition, students also must complete nine credits of advanced electives in courses focused on human biology, health, and society.

Undergraduate students in these programs have a faculty adviser with whom they meet at least twice a year. Advisers help students plan their course schedules and can suggest opportunities for individual study or experience outside the classroom.

In all undergraduate programs the correct sequencing of biology, chemistry, and/or nutrition courses is very important. Students considering these programs should get detailed information about course requirements from the division's Academic Affairs Office, 509-335 MV. This office offers a wide range of advising materials to help students develop a program of study that matches students' 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 terms 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 academies for the American Dietetic Association (ADA). Courses in foods, nutrition and disease, microbiology, management, statistics, and nutritional care are added to the courses required for the nutrition programs. For more information about meeting ADA requirements, contact DNS Academic Affairs Office, 335 MVR.

**Exercise, Nutrition, and Health**

**Promotion:**
Students should complete a course in physiology and a course in anatomy after introductory biology. Students can complete the Applied Exercise Science Concentration at Ithaca College, which includes courses in kinesiology, exercise physiology, and biomechanics. Students who wish to apply to graduate schools to study physical therapy should complete a year of introductory physics, a course in statistics, a course in ethics, and three courses in psychology. Students should check the specific requirements of their schools of interest. For information about the Applied Exercise Science Concentration, contact the DNS Academic Affairs Office, 309 MVR.

**Biomedical Research/Nutritional Biochemistry:**
Recommended electives include calculus, physics, genetics, advanced biology and chemistry, toxicology, and nutritional sciences courses related to the physiology, biochemistry, and metabolism of different nutrients and disease states.

**Public Health and Community Nutrition:**
Suggested electives include courses in communications, education, human development, policy analysis, and management, maternal and child nutrition, geriatric nutrition, nutrition and disease, and food economics.

**Nutrition, Food, and Business:**
Recommended electives include courses in management, marketing, economics, communications, hotel administration, and food science.

**Nutrition and Agriculture:**
Recommended electives include courses in food science, animal science, plant sciences, international agriculture, agricultural economics, biological sciences, and rural sociology.

**International Nutrition:**
Recommended electives include courses in language, anthropology, agricultural economics, policy, economics, rural 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 term 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 400, 401, 402) 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 adviser and the approval of the associate director for academic affairs or consider applying to the honors program.

**HONORS PROGRAM**
The honors program, leading 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, is a culminating experience that is awarded 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, complete an original piece of research (at least six credits of NS 499), 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 J. T. Brenna, B38 Savage Hall, or C. Bisogni, 328 MVR.

**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.

**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 703) 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, please write for the brochure Graduate Study in Nutrition, available from the Director of Graduate Studies, Field of Nutrition, Cornell University, 309 MVR Hall, Ithaca, NY 14853-4401; telephone (607) 255-4410; web site: www.nutrition.cornell.edu/grad.html; e-mail: nutrition_gfr@cornell.edu.

**COURSES**

**NS 115 Nutrition, Health, and Society**
Fall. 3 credits. S-U grades optional. M W F 1:25. D. Levitsky.
The course discusses the facts and fallacies concerning the role that nutrition, exercise, and other health behaviors play in preventing disease, maintaining good health, and maximizing athletic performance. Emphasis is on understanding the biological mechanisms through which good nutrition and regular exercise affect psychological and physical health.

**NS 116 Personalized Concepts and Controversies**
Fall. 1 credit. Corequisite: NS 115. S-U grades only. Limited to freshmen and transfer students. 10 per section. TBA. J. Swanson.

This course provides students enrolled in NS 115 individualized assistance in many skills including using computers to analyze diets, finding and using scientific references, understanding and criticizing scientific articles, and reviewing material presented in lectures.

**NS 120 Nutrition and Health: Issues, Outlooks, and Opportunities**
Spring. 1 credit. S-U grades only. Limited to 120 freshmen, sophomores, and juniors, others by permission of instructor. W 12:20. E. West.

A course 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. This is not an introductory nutrition course for nonmajors.

**NS 200 Vegetarian Nutrition: An Introduction**
Fall. 3 credits. S-U grades optional. Prerequisite: NS 115 advised but not essential. T 10:10-11:25. T. C. Campbell.

This introductory course surveys vegetarianism from a variety of nutrition and health considerations. The material to be presented and discussed primarily includes the empirical scientific evidence presented for easy comprehension for students without nutrition training. The course also considers the historical and sociocultural roots, both ancient and of more recent times, that have led to the growing interest in, and acceptance of, this type of dietary practice. Particular attention is given to the role of vegetarianism in the prevention and reversal of chronic degenerative diseases. Special topics on competitive sport, childhood nutrition, food preparation, and dietary transition are offered. Internationally known guest speakers provide six to eight of the lectures.

**NS 222 Maternal and Child Nutrition**
Fall. 3 credits. Prerequisites: NS 115 and a college biology course or instructor’s permission. S-U grades optional. Limited to 25 students. Prerequisites are required in room 309 MVR Hall. Some Saturday classes will be required. T 1:25-2:40. C. Garza.

The course focuses on the biological bases of nutritional requirements in pregnancy, lactation, infancy, and childhood through adolescence. The course stresses critical analyses of beneficial and adverse outcomes of diverse nutrient intakes and dietary patterns, assessments of nutritional status, and the integration of nutrition, other life sciences, and social conditions in understanding nutritional needs during these life stages. Topics include oral contraception and health, relationships between maternal diet and pregnancy outcomes, breast- and formula feeding; childhood and adolescent obesity, and the nutritional needs of young children and adolescents.

**NS 245 Social Science Perspectives on Food and Nutrition**

Theories, concepts, and methods from the social sciences will be used to examine food, eating, and nutrition. Course uses the food and nutrition system and the food choice process as conceptual models for examining the scope of social aspects of nutrition.

**NS 247 Food for Contemporary Living**
Fall and spring. 2 credits. Laboratory sections limited to 52 students. Laboratory preregistration during course preregistration required in 309 MVR Hall. Laboratory coat or apron required. Fall and spring T 1:25-4:25 or R 9:05-12:05. E. Gier.

Emphasizes meal planning for healthy individuals using national nutrition standards; the development of presentation skills; the application of sensory evaluation techniques; food science principles as they apply to cooking and ethical and cultural influences on cuisine.

**NS 275 Human Biology and Evolution**
(also BIOEE 275 and ANTH 275)
Fall. 3 credits. S-U grades optional with permission of either instructor. MWF 10:10; disc. M. Lees every W and F; occasional lectures on M. Offered alternate years. Next offered 2005-2006. K. A. R. Kennedy, J. D. Haas. See BIOEE 275 for course description.

**NS 300 Special Studies for Undergraduates**
Fall or spring. Prerequisite: permission of instructor. S-U grades optional. DNS faculty.

Special arrangements can be made to establish equivalency for courses not transferable 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 306 Nutritional Problems of Developing Nations**

Students will gain an overview of the most important nutritional 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. The class will use the health care/nutrition framework to cover the causes and effects of undernutrition and biosocial aspects of nutrition. The course provides an opportunity to examine in depth selected topics from lecture.

**NS 315 Obesity and the Regulation of Body Weight (also PSYCH 613)**
Spring. 3 credits. Prerequisites: NS 115. PSYCH 101. Limited to juniors and seniors.


This course is a multidisciplinary discussion of the causes, effects, and treatments of human obesity. Topics include the biopsychology of eating behavior, the role of obesity, the role of activity and energy metabolism, the psychosocial determinants of obesity, anorexia nervosa, therapy and its effectiveness, and social discrimination.

**NS 320 Introduction to Human Biochemistry**
Fall. 4 credits. Prerequisites: one year college biology; one year college general chemistry; and CHEM 257 or 357-358; or permission of the instructor. S-U grades optional. Next offered 2005-2006. MWF 10:10; sec. T 1:25. W. Arion, P. Stover.

The principles of biochemistry are presented within the context of human health and disease. Metabolism of carbohydrates, lipids, proteins, and selected micro-nutrients is taught from a perspective that emphasizes their role in supporting the structure and physiological functions of the major organs of the body, including the blood. The concepts of enzyme catalysis, enzyme regulation, hormone action, and bioenergetics are incorporated within this framework. The emphasis on the biosynthesis of eukaryotic DNA structure, function, and gene expression are covered with reference to their importance in regulating metabolism and the impact of a changing nutrient environment.

**NS 331 Physiological and Biochemical Bases of Human Nutrition**
Spring. 4 credits. Prerequisite: BIOBM 350 or 351, or NS 320, or equivalent. S-U grades optional. Lec MWF 10:10; disc. W 12:20 or R 8:00. C. McCormick.

This course examines the biochemical and physiological bases of human nutritional requirements. The instructors use 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. The discussion sections and problem sets provide an opportunity to examine in greater depth selected topics from lecture.

**NS 332 Methods in Nutritional Sciences**
Fall. 3 credits. Each section limited to 18 students. Prerequisites: NS 345, NS 331 preferred or concurrent registration. Laboratory preregistration during course preregistration required in 309 MVR. One evening prelist to be scheduled. Lec M 12:20; lab MWF 1:25-4:25 or T R 10:10-11:10. M. N. Kazimiroff.

Laboratory introduction to principles and analytical techniques of nutritional research. Emphasis is on analytical concepts and skills required to determine nutrient function and nutritional status of individuals. Topics include methods of nutrient, metabolic, and enzyme analysis in body fluids; methods for assessing individual food intake and nutritional status; and methods for assessing the composition of foods.

**NS 341 Human Anatomy and Physiology**
Spring. 4 credits. Prerequisites: college biology; NS 115 recommended. Completion of laboratory permission forms required in 309 MVR during course enrollment period. Limit 18 per lab. Attendance is required at first lab, or you will forfeit your placement.
For further information go to room 309 MVR.LEC M W F 11:15, lab W 2:30-4:25 or R 9:05-11:00 or R 2:30-4:25.
V. Utermohlen.

Introduction to human anatomy and physiology with particular emphasis on aspects of relevance to the nutritional sciences and medicine. All major organ systems will be covered. Laboratories emphasize location, recognition, and description of anatomical structures. Testing of physiological functions focuses on tests with nutritional and medical relevance.

**NS 345 Nutritional and Physicochemical Aspects of Food**
Spring. 3 credits. Prerequisite: college course in organic chemistry or biochemistry. S-U grades optional. T R 1:25-2:40. B. Lewis, B. Parker.
A study of the nutritional, physical, and chemical properties of foods including composition, food structure, enzymic and nonenzymic phenomena, and processing/ preparation aspects. Issues related to food safety, regulation, and food composition databases are also discussed.

**NS 346 Introduction to Physicochemical Aspects of Foods—Laboratory**
Spring. 1 credit. Each session limited to 18 students. Limited to dietetics students in DNS. Prerequisites: NS 345 or concurrent registration; a college course in organic chemistry and permission of instructor during course registration (permission-of-instructor forms must be obtained from and returned to 309 MVR). Letter grade only. M 12:20-3:20 or T R 9:05-12:05. B. Lewis, B. Parker.
Laboratory exercises are designed to illustrate principles related to food quality and ingredient functionality and to introduce students to the analytical methodology associated with food evaluation.

**NS 347 Human Growth and Development: Biological and Behavioral Interactions (also HD 347 and B&SOC 347)**
Spring. 3 credits. Prerequisites: BIO G 101 or 109 or equivalent; HD 115 or PSYCH 101 or equivalent; M W F 1:25. Offered alternate years. Not offered 2005-2006.
J. Haas, S. Robertson.
See HD 347 for course description.

**NS 361 Biology of Normal and Abnormal Behavior (also PSYCH 361)**
Fall. 3 credits. Prerequisites: BIO G 101-102 and PSYCH 101, or permission of the instructor. A fundamental knowledge of biology and psychology is essential. S-U grades optional. Limited to 40 juniors and seniors. M W F 9:05. B. Strupp.
Serves as an introduction to biological factors thought to influence behavior and/or cognitive functioning. Biological, psychological, and sociological influences are integrated. Topics include nutrition and behavior, psychiatric disorders, developmental exposure to environmental toxins and abused drugs, biopsychology of learning, memory, intelligence, and related cognitive disorders.

**NS 380 Integrating Food Systems and Human Nutrition Needs**
Spring. 2 credits. Prerequisites: NS 115 or FOOD 200 or AN SC 100. Letter grade only. T R 8:40-9:55. J. Wilkins.
This is a student-centered course that uses case studies to examine the link between human nutrition and health issues and those involved in systems of food production and distribution. Student teams investigate new and existing technological options within food systems that can be used to address domestic or international human nutrition needs.

**NS 398 Research in Human Nutrition and Health**
Fall 1 credit. Open to all students. Required for students in honors research program sponsored by the Division of Nutritional Sciences. May be offered in spring if enrollment warrants. S-U grades optional. T R 1:25-2:40. B. Lewis, J. Bissigni.
This lecture course focuses 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. The course introduces the various approaches and methods used by researchers and addresses the topics of ethics and research controls. The course describes the 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 400-401-402-403 Special Studies for Undergraduates**
Fall or spring. Credits to be arranged. S-U grades optional. Division 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 associate director for academic affairs. The form, available from the division office, 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 current registration, or change-of-registration period, students should submit the special-studies form to the associate director for academic affairs as early as possible.

**NS 400 Directed Readings**
Study that predominantly involves library research and independent reading.

**NS 401 Empirical Research**
Study that predominantly involves data collection and analysis or laboratory or studio projects.

**NS 402 Supervised Fieldwork**
Study that involves both responsible participation in getting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

**NS 403 Teaching Apprenticeship**
Study that includes assisting faculty with instruction.

**NS 421 Nutrition and Exercise**
Spring. 3 credits. Prerequisites: BIOAP 311 or NS 341 and NS 331. Limited to nutrition majors, others by permission of the instructor. S-U grades optional. Lec T R 11:15, sec T or R 8:00-9:55 or F 1:25-3:15. S. Travis.
Designed for nutrition majors, this course 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 are made to various sports. Critical thinking skills are enhanced by critique of studies on sports nutrition-related topics and the evaluation of popular sports nutrition claims.

Students learn educational strategies for communicating with the recreational and professional athlete, coach, and trainer.

**NS 425 Nutrition Communications and Counseling**
Spring. 3 credits. Prerequisites: NS 115, NS 245 Dietetics/Nutrition majors preferred. Limited to juniors and seniors. Letter grades only. Lec M 1:25, Sec W 1:25-3:15 or F 8:00-9:55. 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. The course provides hands-on experiences in counseling, educational program development, and oral and written communications.

**NS 431 Mineral Nutrition and Chronic Disease**
Fall. 3 credits. Prerequisites: NS 331, AN SC 410; or permission of instructor. S-U grades optional. T R 11:15. C. McCormick.
Students evaluate the evidence that diet plays a role in osteoporosis and hypertension. An additional goal of the course is to review the data upon which recommendations for daily nutrient intakes are currently based and the biological basis of current recommendations. Class discussion of key research articles is conducted and evaluated.

**NS 441 Nutrition and Disease**
Fall. 4 credits. Prerequisites: NS 331 and a human physiology course. S-U grades optional. M W F 10:10, F 8:00.
V. Utermohlen.
Study of the anatomical, physiological, and metabolic abnormalities in acute and chronic illness and the role of nutritional therapy in their prevention and care. Topics covered include: nutritional assessment, nutritional pharmacology, starvation, infection, trauma, cancer, diabetes mellitus, and renal, cardiovascular, pulmonary, skeletal, neurological, liver, and gastrointestinal disorders.

**NS 442 Implementation of Nutrition Care**
Fall. 3 credits. Prerequisites: NS 115, NS 247, concurrent registration in NS 341 (or equivalent background in either course). S-U grades optional. Lec M W F 9:05. E. Gier.
Development of skills necessary to implement nutrition care in clinical settings: nutrition screening, dietary assessment, principles of medical nutrition therapy, menu planning for disease states, the role of other allied health practitioners in assuring nutritional health, and reimbursement and legislation in dietetics practice.

**NS 450 Public Health Nutrition**
Spring. 3 credits. Prerequisites: NS 115 and one course dealing with population-level studies, e.g., NS 245, HD 250, IAM...
mainly on breakthroughs associated with present-day knowledge. The course focuses and retrospective assessment in view of encompasses detailed analysis of the relevant covered in detail through discussions of the impact of the findings on public health, Key topics in biomedical research are course provides a health context that enriches to cardiovascular risk, micronutrients and public health considerations and concepts disease. The course integrates biological markers in understanding the etiology of specific topics of current interest. Emphasis is on the conceptualization of epidemiology as an ecological science that studies the interdependence and interaction of human health, social, cultural, and physical environment. Intended for advanced undergraduates and graduate students with a interest in health, human biology, nutrition, or epidemiology. 

**NS 452 Molecular Epidemiology and Dietary Markers of Chronic Disease**

Spring. 3 credits. Prerequisites: upper-level biology course, introductory statistics course (can be taken concurrently), or permission of the instructor. S-U grades optional. M W 2:55–4:10. P. Cassano. This course provides an introduction to chronic disease etiology and covers the natural history of the major chronic diseases affecting the U.S. population. The course focuses on the use of biological markers in understanding the etiology of cardiovascular disease, cancer, and lung disease. The course integrates biological and epidemiological information as well as public health considerations and concepts related to the prevention of disease. Topics include gene-nutrient interaction in relation to cardiovascular risk, micronutrients and cancer risk, and nutritional influences on the immune system in relation to asthma risk. The course provides a health context that enriches the learning experience in other advanced courses, particularly in biology and nutrition.

**NS 455 Nobel Prizes in Biomedical Research**

Spring. 2 credits. Prerequisites: a college course in biochemistry and/or cell biology, e.g., BIOBM 330, BIOBM 331–332, NS 320, BIOBM 432. M W 9:05–10:10. P. Soloway. Key topics in biomedical research are covered in detail through discussions of selected Nobel prizes. For each specific biomedical problem addressed, the discussion encompasses detailed analysis of the relevant experiments and ensuing data, evaluation of the impact of the findings on public health, and retrospective assessment in view of present-day knowledge. The course focuses mainly on breakthroughs associated with two major public health issues: infectious diseases and cancer. Other topics discussed include: vitamins, lipid metabolism, prions, and technical breakthroughs such as DNA synthesis, mutagenesis, and PCR.

**NS 457 Economics of Hunger and Malnutrition (also ECON 474)**

Spring. 3 credits. Prerequisites: ECON 101 and introductory statistics, or permission of the instructor. S-U grades optional. M W F 9:05. D. Sahn. This course focuses on the analysis of global hunger and malnutrition and brings together the dimensions, causes, and solutions to hunger and malnutrition, particularly in developing countries. Grades are based on a mid-term and a final exam, a term paper, and class participation.

**NS 475 Mechanisms Underlying Inheritance and Developmental Defects (also BIOPAP 475)**

Spring. 3 credits. Prerequisites: BIOBM 330, 331–332 or 353 (may be taken concurrently). Lab M W T 1:25. E. Frongillo. Developmental defects are present in nearly 5 percent of humans. Drawing upon current research, this course explores the causes of birth defects and 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 488 Applied Dietetics in Food Service Systems**

Spring. 3 credits. Limited to 27 students. Prerequisites: food service management course, BIOMI 290. White lab coat is required. Approximately $30.00 will be needed for special supplies/activities. Lab. M W T 10:10. A. Bensadoun. Students gain experience in facility design; equipment selection and use; and food service production; computer-assisted management; employee training; and sanitation and safety standards. The course integrates biological and epidemiological information as well as public health concepts and paradigms related to the prevention of disease. Topics include gene-nutrient interaction in relation to cardiovascular risk, micronutrients and cancer risk, and nutritional influences on the immune system in relation to asthma risk. The course provides a health context that enriches the learning experience in other advanced courses, particularly in biology and nutrition.

**NS 499 Honors Problem**

Fall and spring. Credits to be arranged. Open only to students accepted 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 (900-level course work or experience in nutrition, or permission of the instructor. M W F 10:10–11:15. M. N. Kazarnoff, J. F. Habicht, and division faculty.

An overview course for beginning graduate students that introduces them to the full breadth of nutritional science disciplines, including quantitative and qualitative sciences. Also suitable for seniors as an integrating course. The course presents concepts and paradigms of molecular biology, biochemistry, clinical nutrition, epidemiology, anthropology, economics, program planning and administration, policy development, and ethics. The course uses vitamin A as the example. Emphasis is placed on the integration of factual and conceptual knowledge to solve nutrition problems in human societies.
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 will examine selected epigenetic phenomena described in several eukaryotes, mechanisms regulating these effects, and their phenotypic consequences when normal regulation is lost. Reading materials will be from current literature, and participation in class discussion is required.

**NS 611 Molecular Toxicology (also TOX 611)**

Spring. 3 credits. Prerequisite: TOX 610 and a full-year 400-level course in biochemistry or equivalent. S-U grades optional. Offered alternate years, not offered 2005-2006. TBA. S. Bloom.

A study of the fundamental biochemical mechanisms of absorption, transport, metabolism and excretion of drugs, carcinogens, and toxicants. Emphasis is placed on oxidative and conjugative pathways of metabolism and of environmental and nutritional factors that influence toxicant metabolism and disposition. Methods of evaluating in vivo and in vitro metabolism are also addressed.

**NS 614 Topics in Maternal and Child Nutrition**

Fall. 3 credits. Prerequisites: for undergraduates only, NS 331, and 222 or 347, BIO AP 311, and permission of instructor. T R 8:30-9:55. Next offered 2005-2006. K. Rasmussen.

An 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 617 Teaching Seminar**

Fall or spring. 0 credit. Limited to division graduate students and students who have permission of the instructor. S-U only. E. West, D. Todd.

Provides 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 618 Teaching Experience**

Fall or spring. 0 credit. Limited to division graduate students and students who have permission of instructor. S-U only. E. West. Designed to provide experience in teaching nutritional sciences by direct involvement in college courses under supervision of a faculty member. The aspects of teaching and the degree of involvement vary, depending on the needs of the course and the experience of the student.

**NS 619 Field of Nutrition Seminar (also AN SC 619)**

Fall or spring. 0 credit. S-U only. M 4:00. Faculty and guest lecturers. Lectures on current research in nutrition.

**NS 620 Food Carbohydrates (also FOOD 620)**


A consideration of the chemistry of carbohydrates, including sugars and complex carbohydrates (starches, pectins, hemicelluloses, gums, cellulose, and glycoconjugates). Emphasis is placed on intrinsic chemistry, functionality in food systems, and changes occurring during food processing and storage.

**NS 625 Community Nutrition in Action Seminar**

Fall. 5 credits. Limited to dietetic interns. M 125-3-25. S. Tannenbaum.

This course 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. Emphasis is placed on understanding community contexts and the evaluation of program implementation by community organizations. Students also work with community nutritionists to develop nutrition programs for communities, evaluate program effectiveness, and explore the many issues facing community food and nutrition practitioners.

**NS 626 Special Topics in Food**

Fall. 2 credits. TBA. B. Lewis.

This course provides a discussion of current research on selected topics related to functional foods and nutraceuticals/phytochemicals.

**NS 630 Anthropometric Assessment**

Spring. 1 credit. Prerequisite: NS 351 or equivalent and permission of the instructor. 5 weeks only. Offered alternate years. W 125-4-25. Next offered 2005-2006. J. Haas.

Topics covered include lecture/lab course on biological basis of anthropology for nutritional status assessment, quality control of anthropometric data, applications to special groups (infants, children, adolescents, pregnant women, and the elderly), statistical analysis, and anthropometric data, references standards and interpretation, measurement techniques of anthropometry, and body composition assessment.

**NS 635 Introduction to Community Nutrition Research for Dietetic Interns**

Fall 2 credits. Prerequisites: enrollment in Cornell Dietetic Internship Program or equivalent background and research placement. M 10:00. C. Biscogni.

An introduction to the paradigms, concepts, methods, and issues involved in community nutrition research. Dietetic interns conduct individual research projects at their community nutrition placement sites. Course lectures, readings, and activities support students as they design, develop research methods, collect data, and interpret findings. Students write a proposal, apply for human subjects approval, prepare a written report, and present an oral report.

**NS 637 Epidemiology of Nutrition**

Spring. 3 credits. Limited to graduate students. Prerequisites: BTRY 602 and concurrent registration in BTRY 603 or equivalent knowledge. Basic knowledge about the nutritional aspects of growth and development and about nutritional biochemistry. T 3:00-5:00. J-P. Habicht.

This course covers principles of nutritional epidemiology, impact assessment of nutrition intervention programs, and nutritional surveillance. Principles of pragmatic nutritional information in decision making are presented. The course shows how the biochemistry and physiology of nutrition can be related to epidemiological assessment and research strategies.

**NS 638 Epidemiology of Nutrition**

Fall. 3 credits. Limited to 20 graduate students. T R 10:10-12:05. J. Sobal.

Social science theories from sociology, psychology, anthropology, economics, political science, geography, and history that contribute to understanding food, eating, and nutrition will be discussed to understand how paradigms, theories, and models apply to nutrition topics, issues, and problems.

**NS 644 Community Nutrition Seminar**

Fall and spring. 1 credit. S-U only. Fall M 11:15, spring M 12:20. 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 646 Seminar in Physicochemical Aspects of Food**

Spring. 1-3 credits. Prerequisite: a college course in organic chemistry or biochemistry. S-U grades optional. T R 1:25-2:40. B. Lewis, B. Parker.

An introduction to physicochemical aspects of food, for graduate students who have had limited or no work in this area. The seminar uses the lectures of NS 345 as a basis for supplementary readings and critical review of research on selected topics.

**NS 650 Assessing Food and Nutrition in a Social Context**

Fall. 4 credits. Prerequisite: course in social sciences. Letter grades only. T R 1:25-2:40. D. Pelletier, G. Pelto.

Food and nutrition problems in developed and developing countries may manifest themselves in biological or functional terms, but their causes and solutions ultimately are rooted in the socio-political world. This course provides multidisciplinary perspectives and some community nutritionists needed to assess and analyze the social context of nutrition problems. The course is relevant to developed and developing countries and to research and practice related to community nutrition as well as nutrition policy.
NS 651 Food and Nutrition Action in a Social Context
Spring, 3 credits. Prerequisites: at least 1 course in social sciences; NS 650 strongly recommended. S-U grades only. T R 12:20-1:10. E. A. Frongillo. This course builds upon the perspectives developed in NS 650. It provides a framework for combining socio-political considerations and analytical criteria in the planning, implementation, and evaluation of nutrition actions at community and policy levels. Case studies from the United States and developing countries are used extensively for examining a wide range of nutrition actions from the perspective of this integrated framework.

NS 660 Special Topics in Nutrition
Fall or spring, 3 credits maximum each term. Registration by permission of the instructor. Division 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 and/or study offered. Topics may be changed so that the course may be repeated for credit.

NS 680 International Nutrition Problems, Policy, and Programs
Spring, 3 credits. Prerequisite: permission of instructor. T R TBA. Offered alternate years. Not offered 2005-2006. International Nutrition faculty. Designed for graduate students who want to learn about the important nutritional problems of developing countries. The major forms of malnutrition related to poverty and their underlying causes are discussed. Emphasis is placed on programs and policies that can help poor countries and communities improve their nutritional and health status.

NS 685 Empirical Methods for the Analysis of Household Survey Data: Application to Nutrition, Health, and Poverty (also ECON 771)
Spring, 3 credits. Prerequisites: intermediate microeconomics, intermediate statistics or econometrics (through multiple regression and limited dependent variable models), or permission of the instructor. M W TBA. D. Sahn.

The course focuses on empirical methods for the analysis of household survey data. Students examine a series of measurement and modeling issues focused on health and nutrition, education, and poverty. In addition, they explore methods to evaluate social programs. Course readings and data that are used for hands-on empirical exercises are largely from Africa and Asia.

[NS 690 Trace Element and Isotopic Analysis (also CHEM 629)
Spring, 3 credits. Primarily for graduate students and advanced undergraduates. Prerequisite: CHEM 288 or 390, 302 or CHEM 310 and MATH 112, or permission of instructor. S-U grades only. T R 11:15. Offered alternate years. Next offered 2005-2006. J. T. Bremer.

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 of CHEM 628/NS 690 focus on IRMS instrumentation and are offered as a separate 1 cr. special topics course (NS 660).]

NS 698 International Nutrition Seminar
Fall and spring. No credit. No grades given. R 12:20-1:10. E. A. Frongillo. This seminar series 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 699 Special Topics in International Nutrition
Fall and spring, 3 credits maximum each term. Registration by permission of instructor. Faculty in International Nutrition Program.

This option is 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 topic. Because the topics change, the course may be repeated for credit.

NS 702 Seminar in Toxicology (also TOX 702)
Fall or spring. 1 credit. S-U grades only. F 12:20. Staff.

The seminar program covers varied topics in biochemical, genetic, nutritional, veterinary, and regulatory toxicology, ecotoxicology, and environmental chemistry. Included are 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 703 Seminar in Nutritional Sciences
Fall and spring. 1 credit. S-U grades only. T R 12:20 or W 12:20. Division 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 899 Master's Thesis and Research
Fall or spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional. Division graduate faculty.

NS 999 Doctoral Thesis and Research
Fall or spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional. Division graduate faculty.

FACULTY ROSTER
Aron, William J., Ph.D., U. of N. Dakota Emeritus Prof.
Pensadoun, Andre, Ph.D., Cornell U. Prof.
Nutritional Sciences/Physiology
Bisogni, Carole, Ph.D., Cornell U. Prof.
Bromley, Mary Beth, Ph.D., Cornell U. Prof.
Bremner, J. Thomas, Ph.D., Cornell U. Prof. and Director of Undergraduate Studies

Campbell, T. Colin, Ph.D., Cornell U. Jacob Gould Schurman Emeritus Professor of Nutritional Biochemistry
Cassuto, Patricia, Ph.D., U. of Washington. Asst. Prof.
Chen, Junshi, M.D., Peking Medical College, China. Adjunct Prof.
Devine, Carol M., Ph.D., Cornell U. Assoc. Prof.
Dollfuhe, Jamie, Ph.D., U. Texas. Assoc. Prof. and FNNEP Leader
Frongillo, Edward, Jr., Ph.D. Cornell U. Assoc. Prof.
Garza, Ciberteto, M.D., Baylor College. Ph.D., MIT. Prof. and Director
Gillespie, Ardyth, Ph.D., Iowa State U. Assoc. 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
Kazarinoff, Michael N., Ph.D., Cornell U. Assoc. Prof., Nutritional Sciences/ Biochemistry, Morphology and Cell Biology
Levitsky, David A., Ph.D., Rutgers U. Prof.
Lewis, Bertha A., Ph.D., U. of Minnesota. Assoc. Prof.
Manor, Danny, Ph.D., Albert Einstein College of Medicine. Asst. Prof.
McCormick, Charles, Ph.D., North Carolina St. U. Assoc. Prof.
Noy, Noa, Ph.D., Tel-Aviv U. (Israel). Prof.
Olson, Christine M., Ph.D., U. of Wisconsin. Prof.
Parker, Robert S., Ph.D., Oregon State U. Assoc. Prof. and Associate Director for Academic Affairs
Pearson, Thomas, Ph.D., Johns Hopkins U. Adjunct Prof.
Pelto, Gretel, Ph.D., U. Minnesota. Prof.
Rasmussen, Kathleen M., Sc.D., Harvard U. Prof.
Rivera, Juan, Ph.D., Cornell U. Adjunct Asst. Prof.
Sahn, David, Ph.D., M.I.T. 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., Med. College of Virginia. Assoc. Prof.
Strupp, Barbara, Ph.D., Cornell U. Assoc. Prof. Travos, Susan M., Colorado State. Lecturer
Utermohl, Virginia, M.D., Columbia U. Assoc. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
West, Elise, Ph.D., Cornell U. Lecturer and Assistant Director for Academic Affairs

Other Teaching Personnel
Gier, Emily, MBA, Binghamton U. Lecturer
Swanson, Joy, Ph.D., Cornell U. Research Associate
You, Chasook, Ph.D., Cornell U. Teaching Support Specialist

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 Glenn Reisweber, Artillery, United States Army, Professor of Military Science and Commanding Officer

Major James O'Connor, Military Intelligence, United States Army

Captain Richard Brown, Engineer, United States Army Reserve

Captain Dean Swartwood, Engineer, United States Army Reserve

Master Sergeant Ralph Delosa, Armor, United States Army

**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 normally covering four 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, Washington), 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**

Applicants must be citizens of the United States and be able to obtain a Secret level security clearance prior to being commissioned as lieutenants. (Noncitizens may enroll in selected portions of the program.) 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 are subject to the approval of the Professor of Military Science. Enrollment in specific 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 into the United States Army.

**Four-Year Program**

The Four-Year Program is open to students in their freshman year or, with the approval of military and university authorities, to sophomores in a five-year degree program. 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, if qualified. Under the Four-Year Program students enroll in the Basic Course (MIL S I and II) during the first two years, and the Advanced Course (MIL S 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 camp, with pay, between the junior and senior years. All 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.

**Basic Course (MIL S I and MIL S II)**

Students in the first year of the Basic Course take one classroom course in military science in the fall and spring semesters, for which they receive academic credit depending upon their college. These courses include study of the U.S. organization for defense and principles and techniques of leadership and management.

Students also participate in leadership modules that include rappelling, orienteering, drill and ceremony, physical training, winter survival, rifle marksmanship, historical site visits, land navigation, interpersonal communication, and individual tactical training. These modules are designed to promote personal development and enrichment. While they do not receive academic credit for these activities, students may receive physical education credit.

Typical freshman participation in Army officer education is 6 program-related hours per week.

In the fall of the second year, students take a two-credit course in American military history. In the spring of the second year, students take a one-credit course in leadership theory and spend approximately two hours per week in practical leadership training, land navigation, and military skills.

**Advanced Course (MIL S III and MIL S IV)**

The Advanced Course of the Four-Year Program is open to students who have successfully completed the Basic Course and are accepted by the Professor of Military Science for further enrollment. It is also open to students who have gained appropriate advanced standing through either successful completion of Basic Camp, a six-week summer training camp, or prior military training. Students entering the Advanced Course must have the equivalent of four academic semesters remaining at Cornell or another degree-granting institution. Students must pass required physical and aptitude tests. In addition, the past performance and desire of each student is evaluated to determine potential for eventual commissioning.

When students are accepted for the Advanced Course or accept a scholarship, they sign a written contract with the U.S. government. Under the terms of the contract, they agree to complete the Advanced Course and to accept a commission if offered. Concurrently with the signing of the contract, students enlist in the United States Army Reserve.

Classroom study in the Advanced Course includes one military science course each semester on such subjects as leadership and management, small-unit tactics, and command and staff organization and functions. The two hours a week of practical leadership training continues, and between the junior and senior years all cadets attend a five-week advanced summer camp conducted at Ft. Lewis, Washington.

**Scholarships**

Scholarships are awarded on the basis of merit and may be available for two, three, or four years. AROTC scholarships are awarded each year to outstanding Basic Camp participants and students in the freshman and sophomore classes. Scholarships pay up to full tuition and mandatory fees. Scholarship cadets and Advanced Course cadets also receive between $250 and $400 a month for up to ten months a year. Scholarship cadets also receive $600 per year toward the cost of textbooks.

**Commissioning**

All students who successfully complete the Advanced Course, including the advanced summer camp, are commissioned as second lieutenants in the United States Army upon graduation.

**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 leadership abilities of the cadet. Officers
beginning active duty attend the Officer Basic Course (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 Course, after which they are released to reserve status.

ROTAC graduates generally serve four years on active duty and four years in reserve status; however, some may serve eight years on reserve duty.

Choice of Branch
Cadets in the second year of the Advanced Course (normally the senior year) may specify the branch of the Army—such as Infantry, Armor, Field Artillery, Air Defense Artillery, Aviation, Corps of Engineers, Signal Corps, Military Police, Military Intelligence—in which they prefer to serve. They are notified in December of the branch to which they are assigned. Appointment in a chosen branch depends upon the student's academic and officer education performance, degree area, and the needs of the Army at that time.

Graduate Study
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.

Benefits
Each cadet in the Advanced Course (MIL S I and MIL S IV) receives $350–600 a month for up to 10 months a year. While attending the advanced summer camp (between the junior and senior years), each cadet receives approximately $700. A cadet in the Two-Year Program receives the same payments as cadets in the Advanced Course and, in addition, receives approximately $700 for summer Basic Camp attendance before entering the Advanced Course.

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.

Freshman Year (MIL S I)
MIL S 101 Foundations of Officership
Fall. 1 credit. Required. Major O'Connor. Students examine the U.S. defense structure in terms of organization, mission, personnel, and relationships among and between military forces and branches and departments of the government. The U.S. Army force structure is examined at all levels. The complexities and magnitude of operating the defense organization are studied to provide a framework for subsequent instruction. Students develop skills in conducting oral and written presentations.

MIL S 102 Basic Leadership
Spring. 1 credit. Required. Major O'Connor. This course 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 introduced in the concepts of integrity, ethics, and professionalism. Classes on historical events and strategy are also presented.

Sophomore Year (MIL S II)
MIL S 201 Individual Leadership Studies/Team
Spring. 1 credit. Required. Prerequisite: MIL S 102 or instructor approval. Master Sergeant Delosa. Students learn the basic principles of group dynamics at the level of the smallest military unit, the squad. Team-leading procedures are introduced through case studies and role-playing exercises. Leadership theories introduced in MIL S 102 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.

MIL S 321 Armed Conflict in Society
Fall. 2 credits. Required Captain Brown. This course 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 nineteenth 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 twentieth century and finishes with an analysis of the future of warfare for the military of the United States.

Junior Year (MIL S III)
MIL S 301 Leadership and Problem Solving
Fall. 2 credits. Required. Captain 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.

MIL S 302 Leadership and Ethics
Spring. 2 credits. Required. Prerequisite: MIL S 301. Captain Brown. The course 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 (MIL S IV)
MIL S 401 Leadership and Management
Fall. 2 credits. Required. Lieutenant Colonel Glenn Reisweber. The course provides an overview of the functions, responsibilities, and interrelationships among small-unit leaders, the commander, and the staff. Discussions focus on actions of small-unit leaders, communication skills, arm operations, the military decision-making process, 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.

MIL S 402 Officership
Spring. 2 credits. Required. Lieutenant Colonel Glenn Reisweber. A continuation of MIL S 401. 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 or two weekend training exercises per semester.

MIL S I Leadership Laboratory I
Fall. Spring. 0 credits. S-U. 0 credits. S-U.
MIL S II Leadership Laboratory II
Fall. Spring. 0 credits. S-U. 0 credits. S-U.
MIL S III Leadership Laboratory III
Fall. Spring. 0 credits. S-U. 0 credits. S-U.
The program covers four years and combines developed during previous ROTC training skills is emphasized. Cadets have an opportunity to practice leadership skills developed during previous ROTC training and summer camp experiences. Includes two to three hours a week devoted to physical fitness.

Professional Military Education (PME) Requirements
In addition to the ROTC classes and leadership laboratories listed above, a number of courses are required as part of the contracted student's academic program. These courses are offered by the university and round out the student's professional education. The PME component of the ROTC program requires at least one college course in each of the following areas: communication skills, military history, and an introduction to computers. These courses must be completed prior to graduation and commissioning. Courses that meet these requirements are approved by the Professor of Military Science.

NAVAL SCIENCE
Captain C. Klyne, United States Navy, Professor of Naval Science and Commanding Officer, Naval ROTC Unit
Lt. Col. T. Stauthburg, United States Marine Corps
Lieutenant G. Buchanan, United States Navy
Lieutenant J. Leinster, United States Navy
Lieutenant W. Towcimak, United States Navy
The objective of the Naval Officer Education Program is to prepare students for service as commissioned officers in the United States Navy or United States Marine Corps; this is done by supplementing undergraduate education with instruction in essential concepts of naval science and by fostering qualities of leadership, integrity, and dedication to country. The program is compatible with most undergraduate major fields of study, including five-year baccalaureate degree programs.

The program covers four years and combines specific courses in naval science and specified academic subjects. These courses supplement weekly professional development sessions in which the practical aspects of naval science and leadership procedures are stressed. It also includes at least one summer-at-sea period.

Though the Navy-Marine Corps Program has been designed to prepare future officers, naval science courses are open to all students at Cornell as space limitations allow.

Requirements for Enrollment
An applicant for the Naval ROTC program at Cornell must be a citizen of the United States. Applicants must have reached their seventeenth 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 60 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 $250-$350-a-month stipend 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. The first way is by applying to the national Scholarship Program and being recommended by the Professor of Naval Science for a scholarship at Cornell University. Successful completion of the program leads to a commission in the Navy or Marine Corps Reserve.

2. The second way is by enrolling at 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. The third way is by entering through the Two-Year Scholarship Program.

College Program
There are two College Programs available.

1. The first 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.

2. The Two-Year College Program begins the senior 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 commissioning, specialized training such as aviation or nuclear power will add additional active duty requirements.

Choice of Assignment
Graduates have the opportunity to request the duty they prefer upon graduation. These requests are given careful consideration, and every effort is made to assign newly commissioned officers to their duty of choice. Among the assignments available are duties in naval aviation as either a pilot or naval flight officer, on submarines, and on surface ships. Other specialties, such as special warfare or medical service corps, may be available on a limited basis.

Marine Corps Options
The United States Marine Corps is an integral part of the Naval Services and is commanded by the Commandant of the Marine Corps. One-sixth of the NROTC scholarship students may be Marine selectees who will be designated Marine-option midshipmen. Upon successful completion of the program they will be appointed second lieutenants in the United States Marine Corps Reserve.

Marine-option midshipmen follow the same program as other NROTC midshipmen for the first two years. Beginning with the senior 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, Virginia, where they undergo six weeks of intensive training known as the USMC Officer Candidate School. Upon commissioning the following year as second lieutenants, they are assigned to the Basic School at Quantico, Virginia. 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, Florida, 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**

**NAV S 141-142, 241-242, 341-342, or 441-442**

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 both drill and professional information briefings. Special emphasis is given to practical experience in actual leadership situations and the fundamentals of seamanship, military formations, movements, commands, discipline, courtmotes, 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 (Naval and Marine)**

**NAV S 101 Fundamentals of Naval Science**

Fall. No credit. G. Buchanan, W. Towcimak.

This course 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.

**NAV S 102 Sea Power and Maritime Affairs**

Spring. 3 credits. G. Buchanan.

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.

**NAV S 157 Principles of Sailing**

Fall and spring. Physical education credit. 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 (Naval and Marine)**

**NAV S 201 Leadership and Management I**

Fall. 3 credits. C. Klyne.

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.

**NAV S 202 Naval Ship Systems I (also M & AE 101)**

Spring. 3 credits. W. Towcimak.

An introduction to primary ship-systems and their interrelationships. Basic principles include thermodynamics, propulsion, mechanical operation, internal communications, electronics, ship structure, and other marine systems are covered.

**Junior Year (Navy)**

**NAV S 301 Principles of Navigation (also ABEN 305)**

Fall. 4 credits. J. Leisner.

An introduction to the fundamentals of marine navigation emphasizing piloting and celestial navigation procedures. This course 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.

**NAV S 302 Naval Operations**

Spring. 3 credits. J. Leisner.

The course 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)**

**NAV S 401 Naval Ships Systems II (Weapons)**

Fall. 3 credits. G. Buchanan.

The principles and theories used in the development of naval weapons systems are examined. Initially, an 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.

**NAV S 402 Leadership and Ethics**

Spring. 3 credits. C. Klyne.

A variety of topics important to the naval officer for both professional and managerial development are reviewed. The material is designed to provide the midshipman with an understanding and appreciation of leadership and ethics in preparation for assignments in the naval service. Through the use of lectures, case studies, and role playing, the student learns various aspects of naval leadership and ethical decision making. Marine-option students may also take this course.

**Junior or Senior Year (Marine Options)**

**NAV S 310 Evolution of War**

Spring. 3 credits. T. Stautberg.

A study of warfare that examines the relationship of military strategy to geography, economics, sociology, technology, and national political realities. This course includes study of the evolution of warfare, including principles of war, weapons, and associated equipment, and the effects of nuclear weapons and guerrilla warfare on traditional concepts of national strategy.

**NAV S 410 History of Amphibious Warfare**

Spring. 3 credits. T. Stautberg.

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)
- computer science (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 better 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 term 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-
DEPARTMENT OF AEROSPACE STUDIES

Colonel Peter Gray, United States Air Force, Professor of Aerospace Studies and Commander, Air Force ROTC Detachment 520

Major Tracy A. Higgins, United States Air Force
Major Robert B. Breese, United States Air Force

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.

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. An applicant must be a United States citizen to become an commissioned officer. Noncitizens may enroll and will receive certificates acknowledging completion of the course but cannot 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.

Though the program is designed to prepare future Air Force officers, the Department of Aerospace Studies' academic courses are open to all students at Cornell.

Four-Year Program

The Four-Year Program consists of General Military Courses (GMC) and Professional Officer Courses (POC). For four-year scholarship cadets, the first year of the GMC carries no military commitment, and students may withdraw at any time. For nonscholarship cadets, both years of the GMC carry no military commitment, and students may withdraw at any time.

General Military Course

Students in General Military Courses (GMC) take a 1 credit Aerospace Studies course each semester. During the freshman year, the student examines the organization and mission of the United States Air Force and the environment of the Air Force officer. In the sophomore year, the student studies the history and development of American airpower. In both years, officer professionalism within the United States Air Force is emphasized.

Student also spend two hours a week in a leadership laboratory. Leadership laboratories provide cadets with an opportunity to put into practice the skills they have learned in their aerospace studies classes. These laboratories focus on the development of officer qualities through such activities as drill and ceremonies, group leadership problems, confidence-building exercises, and guest lectures. In addition, all students participate in summer field training for four weeks between their sophomore and junior years.

Professional Officer Course

The Professional Officer Courses (POC) provide a two-year advanced program of instruction for students who are accepted. The POC must have successfully completed or validated the basic course and must meet academic and physical standards. Each cadet accepted into the POC must sign an agreement to complete the program and accept, if offered, a commission in the United States Air Force upon graduation.

Classroom study in the POC is a 3 credit course each semester. In the junior year, cadets study Air Force leadership and management at the junior officer level. During the senior year, cadets study the elements of national security and the military's role in American society. Leadership laboratory requires two hours a week in the junior and senior years. In leadership laboratory, cadets are exposed to advanced leadership experiences and apply principles of leadership learned in the classroom.

Two-Year Program

The Two-Year Program consists of the last two years (Professional Officer Courses) of the regular Four-Year Program plus a five-week summer training course.

The Two-Year Program is open to all qualified students with two years of academic study remaining at Cornell (graduate or undergraduate) or at schools supported under a crosstown agreement.

One- and One and One-Half-Year Program(s)

There are limited opportunities for students to enter a one-year program. Call 607-255-4004 for more details and current availability.

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. 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 $250-400 nontaxable allowance during the school year. A $510 per year textbook allowance is included in every scholarship. Scholarships do not include the cost of room and board.

Benefits

All cadets in the advanced program (POC)—whether they are on scholarship or not—receive a $250-400-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 the advanced 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 advanced cadets (POC) are entitled to space-available travel on Air Force aircraft flying within the continental United States.

Field Training

There are two types of field training: 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 training; a junior officer training physical training; small arms training; a social-actions program; and supplemental training. The five-week training program includes thirty-six hours of Air Force ROTC academic course
work that substitutes for the freshman and sophomore Aerospace Studies courses.

Cadets may also volunteer for one of many Advanced Training Programs. These programs include but are not limited to the Professional Development Program, Air Force Academy Free-Flight, the United States Air Force (USAF) Exchange Program, Research and Development Experiences, the Academy Soaring Program, and Army Airborne Training.

Commissioning Obligations

All students who successfully complete the AFROTC advanced program (POC) are awarded a baccalaureate degree, tendered a commission, and 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 ten years after completing flying training. Navigators and Air Battle Managers serve six years 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-science 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, transportation, accounting and finance, and other career fields.

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

AIR S 161 The Foundations of the United States Air Force I
Fall. 1 credit. Major R. B. Breese.
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, officer and professionalism, military customs and courtesies, Air Force officer opportunities, group leadership problems, and an introduction to communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

AIR S 162 The Foundations of the United States Air Force II
Spring. 1 credit. Major R. B. Breese.
Continuation of AIR S 161.

Sophomore Year

AIR S 211 The Evolution of USAF Air and Space Power I
Fall. 1 credit. Colonel P. Gray.
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 Afghanistan. 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.

AIR S 212 The Evolution of USAF Air and Space Power II
Spring. 1 credit. Colonel P. Gray.
Continuation of AIR S 211.

Junior Year

AIR S 331 Air Force Leadership Studies I
Fall. 3 credits. Major R. B. Breese.
This course is a study of the leadership, quality management, professional knowledge, Air Force personnel and evaluation systems, ethics, and communication skills required of an Air Force junior officer. Case studies are used to examine Air Force leadership and management situations; they demonstrate practical applications of the concepts being studied. A mandatory leadership laboratory complements this course, providing advanced leadership experiences in officer-type activities, and giving students the opportunity to apply leadership and management principles of this course.

AIR S 332 Air Force Leadership Studies II
Spring. 3 credits. Major R. B. Breese.
Continuation of AIR S 331.

Senior Year

AIR S 401 National Security Affairs/Preparation for Active Duty I
Fall. 3 credits. Major T. A. Higgins.
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, officerhood, military justice, civilan 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.

AIR S 402 National Security Affairs/Preparation for Active Duty II
Spring. 3 credits. Major T. A. Higgins.
Continuation of AIR S 401.

Leadership Laboratory Courses

All Air Force cadets spend two hours a week throughout the academic year in a leadership laboratory, for which no academic credit is given. 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.

AIR S 141-142 Initial Military Experiences
Fall and spring. 0 credits. Required. S-U. 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.

AIR S 241-242 Intermediate Military Experiences
Fall and spring. 0 credits. Required. S-U. This course is designed to help students develop skill in giving commands for drill and ceremonies. They 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.

AIR S 341-342 Junior Officer Leadership Experiences
Fall and spring. 0 credits. Required. S-U. 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.

AIR S 441 Advanced Leadership Experience
Fall. 0 credits. Required. S-U. 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.

AIR S 442 Precommissioning Laboratory
Spring. 0 credits. Required. S-U. 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.
ADMINISTRATION
Alan E. Gantert, director

COURSES
The courses and fees described in this catalog are subject to change or cancellation at any time by official action of Cornell University. For current fee information on physical education courses call 255-4286; for outdoor education courses, call 255-6183, or visit www.coe.cornell.edu.

Enrollment in any course is limited by the space available. Other restrictions are included in the course description. Most courses are coeducational. The specific time and place of class meetings, as well as information about fees, are available at the physical education course registration or may be found on "Bear Access," a package of software for accessing a variety of network services at Cornell. Course fees are billed through the Office of the Bursar.

Additional course offerings may be listed at registration, as the curriculum is frequently reviewed and changed. Drop deadlines for outdoor education courses are earlier than universal deadlines and often earlier than physical education deadlines. COE courses may be added any time by calling 255-6183, or registering online at www.coe.cornell.edu.

Aquatic Courses

Lifeguard Training
Fall and spring. Fee charged. Prerequisite: swimming test consisting of 500 yards, demonstrating 3 strokes, treading water without the use of hands, and retrieving a brick from 7 feet of water, 3 classes a week. An American Red Cross certification course. Practice and execution of lifeguarding first aid and CPR skills and techniques. Certification is awarded in lifeguarding, first aid, O2, AFD, and CPR upon satisfactory completion of the course.

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.

Scuba, Open-Water
Fall and spring. 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.

Scuba, Advanced Open-Water
Fall and spring. Fee charged. Advanced-level open-water training in Cayuga Lake. For those who have completed the open-water course.

Rescue Diver
Fall and spring. Fee charged. Advanced course for scuba divers. For those who have completed Advanced Open Water Scuba certification and are interested in learning rescue and safety techniques.

Dive Master
Fall and spring. Fee charged. Advanced-level scuba course open only to those who have completed the Rescue Diver course. NOTE: This is a long, time-consuming course, which requires the student to be in good physical and swimming shape.

Scuba Diving Trips
Spring. Fee charged. This course is offered during the spring intersession period. Scuba trips to various destinations such as the Bahamas. Locations change from year to year. See the information sheet at the registration table.

Swimming, Introduction to (ARC)
Fall and spring. Fee charged. 6 weeks. Instruction and practice in skills leading to passing the basic swimming proficiency test.

Swimming, Advanced Beginning (ARC)
Spring. Ideal for all who have taken one term 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.

Swimming, Intermediate (ARC)
Fall and spring. Practice of basic skills and five basic strokes: front crawl, back crawl, elementary backstroke, breaststroke, sidestroke.

Swimming, Advanced (ARC)
Fall and spring. Practice of nine strokes: front crawl, back crawl, elementary backstroke, breaststroke, inverted breaststroke, sidestroke, overarm sidestroke, tredgeon, and butterfly.

Swimming Conditioning
Fall and spring. Prerequisite: reasonable swimming ability. Introduction to, and practice of, different conditioning and not an instructional course.

Water Safety Instructor
Spring. Fee charged. Prerequisite: passing of written and skill water tests which are given on the 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.

Bowling Courses

Bowling
Fall and spring. Fee charged. For the beginning and intermediate bowler. Shoe rental is included in the fee.

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.

Ballroom Dancing
Fall, spring. Fee charged. Latin and street boogie. Partners will be rotated as necessary.

Belly Dancing I
Fall and spring. Fee charged. Advanced belly dance movements and combinations that include putting basic and advanced movements to the Beledi, Masmouodi, and Karsilama 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.

Introduction to Swing Dance
Fall and spring. Fee charged. Practice of basic skills in various swing dances: jitterbug, hoofing, tap, and street boogie. Partner sign-in required. This is an introductory course.

Latin Dance
Fall and spring. Fee charged. Partner sign-in required. This is an introductory course that will teach salsa, mambo, Latin, and merengue. Emphasis on listening, feeling, and expressing Latin rhythms with precise detail and technique.

Dance Technique I (also THETR 124)
Fall and spring.
Equestrian Center located on Pine Tree Road near East Hill. First details information will be offered by the equitation staff at the registration sign-up table. Basic—never ridden; Intermediate I—completed basic with knowledge of walk/trot/canter; Intermediate II—walk/trot/canter with control over two-foot-high jumping course; Advanced—strong jumping/dressage skills with experience hunting/showing/eventing. Students must fill out a release form to participate in any riding class.

First Aid/CPR Courses

Emergency Response
Fall and spring. Fee charged. This advanced-level first aid course is the most comprehensive available without NYS certification. Sixty hours of training includes CPR for the Professional Rescuer and oxygen administration, as well as many of the first aid skills taught in a basic EMT class. American Red Cross certification is valid throughout the United States and is accepted by many states as a Certified EMT equivalent. Certification is valid for three years. This certification would be appropriate for camp medical directors and those who work closely with pre-hospital medical staff.

NYS Emergency Medical Technician—Basic
Two-semester course. Fee charged. This intensive 130-hour course is taught throughout both the fall and spring semesters. Course includes training in CPR for the Professional Rescuer, oxygen administration, airway management, fracture management, bleeding control, expanded patient assessment, spinal immobilization, medical anti-shock trousers, and defibrillation. Students will qualify for the NYS EMT Certification Exam upon successful completion of this course. Rigid attendance and participation requirements are strictly enforced.

NYS Emergency Medical Technician—Critical Care
Two-semester course. Fee charged. A course for those who are currently certified NYS EMTs, AEMT-CRITICAL CARE is an intensive 160-hour course that is taught throughout both fall and spring semesters. Course 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 will 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

Fly Fishing and Basic Flytying 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.

Introduction to Freshwater Angling
Fall. Fee charged. This course 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 class consists of an orientation and outings to various locations around the area such as Cayuga Lake and the Susquehanna River.

Fitness Courses

Aerobic Dance
Fall, spring, and summer (6 weeks). Fee charged. A dance program designed to keep the cardiovascular system in top shape by making the body demand increased amounts of oxygen.

Cardio Crazy
Fall and spring. Fee charged. The course is designed to acquaint the student with the various types of indoor aerobic training equipment, rowing machines, tread mills, stair machines, exercycles, and Nordic Tracks, and to teach them to design a personal fitness program incorporating the equipment.

8 O’Clock Rock
Fall and spring. Fee charged. This class combines the best of the principles of weight training and cardio training.

Aerobic Instructor Training
Fall and spring. Fee charged. The course is designed to train the student to teach aerobics and prepare for the A.F.A.A. Primary Aerobic Instructors Certification Test.

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.

Jogging
Fall and spring. This course 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.

Jogging Tours—Distance Running
Fall and spring. A course designed for the intermediate runner who can run an average of 3 miles in 30 minutes. Most tours will be 3-4 miles long and will go through campus and nearby countryside.

Triathlon
Fall and spring. Designed to acquaint students with the components of, and conditioning for, triathlon (running, swimming, and bicycling).

Wellness and Fitness
Fall and spring. Fee charged. "Here’s to a Healthier You!"—a wellness experience for the busy student. This course will assess the student’s physical fitness status, blood-cholesterol levels, and overall lifestyle health habits. Each student will receive an individual exercise prescription and have 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).

Golf Courses

Golf, Introduction to
Fall and spring. Fee charged. A PGA program of instruction is 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. Equipment is furnished.

Golf, Recreational
Fall and spring. Limited to students who are experienced golfers. Fee charged. Students must provide their own clubs. A minimum of 10 rounds of nine holes each must be played to receive credit. Fee covers a semester's membership.

Gymnastics Courses

Gymnastics, Introduction to
Fall and spring. Introduction to gymnastics deals with a majority of the Olympic events. The course will focus on beginner-level skills and is open to both male and female participants.

Ice Skating Courses

Skating, Introduction to
Fall and spring. For beginning to intermediate skaters. Fee charged. Students provide their own skates or rent them at Lynah Rink. Course will cover forward and backward skating, turns, and stops.

Figure Skating, Beginning, Intermediate, and Advanced Levels
Fall and spring. Fee charged. Instruction and practice in basic figure-skating techniques. Forward, backward, crossover, pirouettes, turns, and spirals. Students provide their own skates or rent them at Lynah Rink.

Martial Arts—Self-Defense Courses

Boxing, Introduction to
Fall and spring. Fee charged. The course covers the basic skills of footwork, defensive, and offensive techniques. Skipping rope, shadow boxing, and heavy bag work will be taught as methods for individual aerobic conditioning.

Boxing, Thai
Fall and spring. Fee charged. A martial art system developed from the unique culture of Thailand is a blend of art, science, and sport.

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.

**Fencing, Introduction to**
Fall and spring. Fee charged. Includes warm-up exercises and offensive and defensive moves. Equipment furnished.

**Fencing, Intermediate**
Spring. Fee charged. Prerequisite: Introduction to Fencing or the equivalent. Interclass competition is stressed. Equipment is furnished.

**Fencing, Classical**
Fall and spring. Fee charged. Classical fencing is a martial art that uses the practice of the sword to cultivate self-mastery.

**Renaissance Fencing**
Fall and spring. Prerequisite: Introduction to Fencing or permission of the instructor. Fee charged.

Focuses on the fundamental techniques of 16th to 17th century fencing with an emphasis on safety, balance, line, focus, and distance.

**Judo, Introduction to**
Fall and spring. Fee charged. Conditions and increases suppleness. Continue to develop skills in the two parts of judo: standing techniques (throws and trips) and mat techniques.

**Judo, Intermediate**
Fall and spring. Fee charged. Conditions and increases suppleness. Continue to develop skills in the two parts of judo: standing techniques (throws and trips) and mat techniques.

**Jun Fan/Jeet Kune Do**
Fall and spring. Fee charged. This is a 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.

**Karate, Introduction to**
Fall and spring. Fee charged. A beginning course taught by professional black-belt instructors. Involves mastery of basic blocks, kicks, and punches.

**Karate, Advanced**
Fall and spring. Fee charged. Open to those who have taken basic karate or the equivalent.

**Kung Fu**
Fall and spring. Fee charged. Exploration of 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.

**Self-Defense and Empowerment for Women**
Fall and spring. Fee charged. Basic methods of physical protection for women.

**Tae Kwon Do, Introduction to**
Fall and spring. Fee charged. A Korean martial art distinguished by emphasis on high and powerful kicks. Basic kicking, punching, and blocking emphasized.

**Tae Kwon Do, Intermediate**
Fall and spring. Fee charged. A Korean martial art distinguished by its emphasis on high and powerful kicks. Intermediate-level kicking, punching, and blocking are emphasized.

**Tae Kwon Do, Advanced**
Fall and spring. Fee charged. A Korean martial art distinguished by its emphasis on high and powerful kicks. Advanced-level kicking, punching, and blocking are emphasized.

**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.

**Outdoor Education Program**
For further information, class schedules, or to register any time, call 255-6183, or visit us online at www.coe.cornell.edu.

**Climbing Courses**

**Basic Rock Climbing**
Fall, spring, and summer. Fee charged. Six indoor climbing sessions at the Lindseth Climbing Wall.

**Basic Rock-Climbing for Women**
Fall, spring. Fee charged. Six indoor climbing sessions at the Lindseth Climbing Wall taught by and for women.

**Basic Rock Climbing for 24 and Over**
Fall. Fee charged. Non-credit course. Four indoor climbing sessions at the Lindseth Climbing Wall for people age 24 and older.

**High Adventure**
Fall, spring. Fee charged. Six sessions combining classes at the Lindseth Climbing Wall and the Hoffman Challenge Course.

**Wellness Rock Climbing**
Fall, spring. Fee charged. Non-credit course. Nine one-hour climbing sessions at the Lindseth Climbing Wall for Wellness Program members only.

**Introduction to Outdoor Climbing Seminar**
Spring. Fee charged. Non-credit course. Introduction to outdoor climbing techniques and equipment. Meets for one evening class and one full weekend day.

**Basic Outdoor Rock Climbing**
Fall. Fee charged. Includes fall break trip. Two indoor classes and a four-day climbing trip to the Shawangunks introduce basic safety, techniques, equipment, and methods for outdoor rock climbing.

**Intermediate Outdoor Rock Climbing**
Fall, spring. Fee charged. Two indoor classes and two weekend trips to the Shawangunks will introduce intermediate level climbing techniques and systems for top-rope anchors.

**Shawangunks Rock Climbing**
Fall, spring. Fee charged. Includes fall break or senior-week trip. Two indoor classes and a four-day advanced climbing camp at the Shawangunks will introduce advanced climbing techniques and systems for outdoor multi-pitch rock climbing.

**Southwest Advanced Rock Climbing**
Spring. Fee charged. Includes spring break trip. Two indoor classes and a one-week advanced rock climbing camp will introduce advanced rock climbing techniques for multi-pitch outdoor climbing. Course takes place amidst the warmth and beauty of the Southwest desert.

**Adirondack Ice Climbing**
Spring. Fee charged. Basic top- rope ice climbing instruction, including a weekend trip to the Adirondacks.

**Backpacking Courses**

**Adirondack Winter Camping**
Fall, spring. Fee charged. Includes winter break trip. Some previous backpacking experience necessary. Permission of instructor required. Learn the fundamentals of winter travel and camping. Course covers trip planning, equipment selection, snowshoe travel, snow shelter construction, and winter safety. A four-day trip to the Adirondacks at the end of winter break includes a peak ascent attempt.

**Backpacking the Finger Lakes**
Fall, spring. Free with 100 percent attendance, otherwise fee charged. Escape from campus on day outings and two weekend trips to explore the glens, forests, waterfalls, vistas, and trails in the local area. This fantastic introduction to backpacking skills will cover basic outdoor living skills, including hiking, navigation, camping, equipment selection and use, backcountry cooking, and safety. No experience necessary. Fee charged for personal rental equipment.

**Trail Maintenance**
Fall, spring. Free with 100 percent attendance, otherwise fee charged. Learn basic trail construction and outdoor living skills on local outings and overnight. Projects may include designing and creating new trails, switchback construction, bridge building, water bar construction, and erosion control. Course includes day outings and one weekend trip. Fee charged for personal rental equipment.

**Women's Backpacking**
Fall. Fee charged. Explore the local trails, glens, forests, and waterfalls in the company of other women. Covers basic outdoor living skills, equipment, camping, cooking, navigation, and safety. No experience necessary. Fee charged for personal rental equipment.

**Southwest Backpacking**
Spring. Fee charged. Includes spring break trip. Spend spring break exploring the wide open spaces of the Southwest. Destination changes year to year. Trip will head 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.
Biking Courses
Mountain Biking
Fall, spring. Fee charged.
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. Participants must provide their own mountain bike.

Mountain Biking in Vermont
Fall. Fee charged. Includes fall break trip. Develop and hone skills for riding a variety of trails, ranging from moderate fire roads to technical single track. Participants must provide their own mountain bike and helmet.

Canoeing Courses
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.

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, bracing, eddy turns, peels, and river safety. Culminates with a weekend river trip.

Caving Courses
Caving
Fall, spring. Fee charged. Learn about the basic safety, techniques, and equipment for caving, finishing with a weekend caving trip.

Hiking Courses
Day Hiking
Fall, spring. Fee charged. Hike and explore Ithaca’s spectacular gorges, state forests, and extensive trail system. Course covers planning and packing for a hike, dressing for the outdoors, map reading, outdoor safety, navigation, and natural history of the area.

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.

Snowshoeing
Spring. Fee charged. Outings in the local state forests will 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.

Snowshoeing, for 24 and Over
Spring. Fee charged. Noncredit course. Learn basic winter travel and snowshoeing skills while exploring some local winter hiking destinations.

Wilderness Survival Skills
Fall. Fee charged. Hands-on course covers principles of survival, shelter building, navigation, fire starting, and water procurement as well as nature observation skills and local natural history. Evening and weekend outings.

Kayaking Courses
Whitewater Kayaking
Fall, spring. Summer. Fee charged. Basic kayaking techniques and equipment use, culminating in a full weekend of whitewater paddling. Pool sessions and local outings will develop skills to read water, scout, ferry, brace, power stroke, and execute eddy turns, peels, and Eskimo rolls. Prerequisite: ability to swim with comfort in deep water without a floatation aid.

Pool Paddling
Fall, spring. Free with 100 percent attendance, otherwise fee charged. Learn a broad range of kayaking skills in the warm comfort and calm waters of the pool. Course will introduce whitewater kayaks, canoes, and sea kayaks, while covering strokes, leans, braces, effective boat-handling skills, kayak Eskimo rolls, and rescues. Pool games, slalom, and general paddling and video taping will be used to hone an understanding of skills and refine techniques.

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.

1,000 Islands Sea Kayaking
Fall. Fee charged. Includes fall break trip. Learn fundamental sea kayak touring skills in the Thousand Islands region of the St. Lawrence River. Course covers equipment, safety, paddling techniques, rescues, trip planning, navigation, considerations for overnight trips, camping, cooking, and travel skills. International travel documentation to Canada required.

Sea Kayaking in Georgian Bay, Canada
Summer. Fee charged. Located in Lake Huron, the Georgian Bay harbors a stunning archipelago of rugged granite shorelines, expansive open bays, and windswept sand dune islands. This week-long kayak touring course will include hands-on introduction to basic paddling techniques, equipment selection and care, deep water rescues, trip planning, natural history, navigation, camping, cooking, and touring skills.

Kayak Rolling Seminar
Fall, spring. Fee charged. Noncredit course. Learn kayak rolling techniques in two evening sessions. Classes take place at the Helen Newman pool.

Introduction to Sea Kayaking Seminar
Fall, spring. Summer. Fee charged. Noncredit course. Class covers equipment, basic paddling techniques, deep water rescues, and considerations for day trips.

Introduction to Slalom Racing Seminar
Spring. Fee charged. Noncredit course. Class covers slalom racing introduction and white water techniques for effectively navigating slalom courses. Prerequisite: comfortable maneuvering in class II water or completion of a COE whitewater class.

Outdoor Leadership and Teambuilding Courses
Outdoor Leadership
Fall, spring. Fee charged. Includes fall or spring break trip. Learn and practice the skills of outdoor leadership and education. Focus will be on refining wilderness skills, outdoor judgment, group facilitation, decision making, and teaching skills. Course culminates in a fall- or spring-break trip where participants plan and lead portions of the trip. Prerequisite: previous backpacking and camping experience.

First Aid Courses
Wilderness First Aid
Fall, spring, summer. Fee charged. Full weekend of wilderness first aid. Includes CPR certification.

Wilderness First Responder
Fall, spring. Offered in January, over winter break; offered 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.

Skiing Courses
Cross-Country Skiing
Spring. Fee charged. Four sessions learning basic cross-country skiing skills and exploring trails.

Cross-Country Skiing, for 24 and Over
Spring. Fee charged. Non-credit course. Four sessions learning basic cross-country skiing skills and exploring local trails.

Basic Telemark Skiing
Spring. Fee charged. Four classes at Song Mountain Ski Area.

Intermediate Telemark Skiing
Spring. Fee charged. Four classes at Song Mountain Ski Area.

Personal Growth Courses
Body-Mind
Fall and spring. Activities are drawn from ancient Eastern practices as well as modern Western psychology, and are designed to give the student first-hand experience of the interaction between their own bodies and minds.

Introduction to Meditation
Fall and spring. Fee charged. This course provides the opportunity to explore a variety of ancient and modern methods designed to bring one to the state of meditation. The methods serve to evoke the deep relaxation from which heightened awareness and creativity arise.

Meditation and Guided Imagery
Fall and spring. Fee charged. The class meets twice a week for a session of guided meditation with imagery. Topics include quiet mind, progressive relaxation, safe space, health and wellness, and enhancing learning. Students should have previous experience with meditation.

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.
Relaxation and Stress Management
Fall and spring.
Introduction to basic relaxation techniques for the reduction of everyday stress. Techniques will be taught that can be used in normal everyday living situations.

Swedish Massage
Fall, spring, and summer. Fee charged.
Learn to give a relaxing, stress-reducing Swedish massage. You will master the basic strokes of Swedish massage and learn about their application to the different parts of the body. Students will use oils and lotions as a part of their training.

Introduction to Massage
Fall, spring, and summer. Fee charged.
Provides an experiential introduction to several types of massage. Include Swedish, shiatsu, polarity, and sports massage. Class members will participate in group exercises and practice on each other during class time. All exercises and techniques can be done while wearing street clothing.

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.

Shiatsu Massage
Fall and spring. Fee charged.
Gain an experimental understanding of your body and learn certain shiatsu massage techniques.

Yoga, Introduction to
Fall, spring, and summer (6 weeks). Fee charged.
Fundamentals of hatha yoga. Covers basic postures, breathing techniques, and deep relaxation. Introduces chanting.

Racquet Sports Courses
Badminton, Introduction to
Fall and spring. Helen Newman Hall.
Fundamental shots, scoring, and general play.

Badminton, Intermediate
Fall and spring. Helen Newman Hall.
Review of fundamental shots, scoring, and general play.

Racquetball, Introduction to
Fall, spring, and summer. Fee charged.
Instruction for beginners. Equipment is furnished. Protective eyewear required.

Squash, Introduction to
Fall, spring, and summer. Fee charged.
Classes for appropriate level of play. Equipment is furnished. Protective eyewear required.

Tennis, Introduction to
Fall, spring, and summer. Fee charged.
Basic skills taught include forehand, backhand, serve, and volley. Scoring methods taught:

Tennis, Intermediate
Fall, spring, and summer. Fee charged.
Review basic strokes plus topspin and underspin. Doubles strategy emphasized.

Tennis, Advanced
Fall, spring. Fee charged.
Advanced strokes and doubles play emphasized. Recommended for tournament players or those with previous team experience.

Tennis, Indoor-Recreational
Fall and spring. Fee charged.
Play is conducted at the new Reis Tennis Center. Players must have high school or college tournament experience or a rating of 3.5 or higher from the USTA. Matches are played in both doubles and singles. Equipment furnished. NO BLACK-SOLE SHOES ALLOWED ON COURTS!

Sailing Courses
Small-Boat Sailing, Introduction to
Fall, spring, and summer (6 weeks). Fee charged.
Learn basic skills necessary to sail small sailboats and basic keelboats safely.

Small-Boat Sailing, Competitive
Fall and spring. Fee charged.
Vanguard 420 sailboat used for the course. USYRA Rules Book used as a text for the course. Fee includes one-year membership in university sailing team program.

Water Skiing
Fall only. Fee charged.
Introductory course for beginning water skiers. Classes will be conducted from East Shore Marina.

Skiing and Snow Boarding
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
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.

Handgun Safety, Introduction to
Fall, spring, and summer (6 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.

Riflery
Fall and spring. Fee charged.
Instruction and practice in the techniques of target riflery from various shooting positions.

Trap and Skeet
Fall, spring, and summer (6 weeks). Fee charged.
Includes lectures and shooting at the Tompkins County Rod and Gun Club range. Guns and shells are furnished.

Team Sports Courses
Basketball
Fall and spring.
Fundamental drills in passing, shooting, and dribbling. Scrimmages each class session.

Ice Hockey, Introduction to
Fall and spring. Fee charged. Prerequisite: basic skating ability. Fee charged.
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.

Ice Hockey, Intermediate
Fall and spring. Fee charged. Prerequisite: beginning hockey or previous participation in organized hockey.

Soccer
Fall and spring.
Introduction to the game. Includes basic individual skills (passing, trapping, shooting) and team play and strategy.

Volleyball, Introduction to
Fall and spring.
Fundamentals of bumping, setting, and spiking. Defensive play and position play are stressed. Classes will scrimmage.

Volleyball, Intermediate
Fall and spring.
Passing and blocking strategy; scrimmages in class.

Volleyball, Advanced
Fall and spring.
Offensive and defensive team strategy is emphasized in class scrimmages.

Weight Training Courses
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 relationship between high-rep light weight lifting, low-rep heavy lifting, and the development of bulk, strength, and endurance.

Independent Study
Independent Study
Fall and spring.
Independent study is designed for those who have difficulty fitting any of the regularly scheduled courses into their academic program. Class activities will be based on personal fitness programs. A term paper is required. Permission to enter this program must be granted by the program director.
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 electronically at the web site of the College of Veterinary Medicine, www.vet.cornell.edu.

Note: Courses listed in brackets [ ] are approved courses that are not offered during the 2004-2005 academic year.

The Professional Curriculum

FOUNDATION COURSES

Foundation courses are interdisciplinary and represent approximately 70 percent of the professional curriculum. In Foundation courses I, III, and IV (VTMED 510, 530, 540), 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 to four 2-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 usually scheduled during the mornings, thereby reserving the afternoons for independent study. By learning in a clinical context, students are able to integrate material from the basic sciences and 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 2004-2005 academic year.

VTMED 510 The Animal Body (Foundation Course I)

Fall. 12 credits. Limited to first-year veterinary students. Letter grades only.
A. J. Bezuidenhout and staff.

This course is designed to enable students to understand the principles of veterinary anatomy at the gross, microscopic, and ultrastuctural levels. Developmental anatomy is emphasized 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 517 Animals, Veterinarians, and Society: Part A (Foundation Course IIa)

Fall. 1.5 credits. Limited to first-year veterinary students. Letter grades only. A fee is charged for the course guide. Live animals are used in course instruction.
N. L. Iby.
This course complements and augments material learned in VTMED 510 (Block I-The Animal Body). The class is divided into small groups and each group meets for 4-5 hours each week during the first 11 weeks of the fall semester. Using the dog, cat, horse, and cow as models for learning how to perform a physical examination, the 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 Block I.

VTMED 520 Cell Biology and Genetics (Foundation Course II)

Fall and spring. 8 credits. Limited to first-year veterinary students. Prerequisite: VTMED 510 The Animal Body. Letter grades only.
R. A. Levine and staff.

Foundation course II is designed to develop an appreciation of the molecular and cellular basis of animal health and disease. Students will 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. Emphasis is placed on defining and characterizing normal cell function and on understanding how mutations in specific genes promote disease. Students become familiar with the common molecular procedures being used to develop new diagnostic and therapeutic tools to maintain health and combat disease. 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 specific genetic diseases, wound repair, and cancer. In both parts, clinical cases are used to illustrate the concepts presented.
This course is designed to develop students' understanding of how an animal maintains itself as a functional organism; 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 527 Animals, Veterinarians, and Society: Part B (Foundation Course Vllb)
This course begins in the last part of fall semester and finishes at the end of winter session. 1.5 credits. Limited to first-year veterinary students. Prerequisite: VTMED 517. Animals, Veterinarians, and Society: Part A. Letter grades only. A fee is charged for the course guide. The lectures consist of one 2-hour session each week, and the laboratories require 10 hours spread throughout the course. Live animals are used in course instruction. N. L. Irby. This course consists of both lectures and laboratory sessions. Lectures partially complement materials learned in VTMED 520 (Block 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 portion of the course reviews basic equine procedures.

VTMED 530 Function and Dysfunction: Part I (Foundation Course Illa)
Spring. 9 credits. Limited to first-year veterinary students. Prerequisite: VTMED 520. Cell Biology and Genetics. Letter grades only. Live animals are used on a limited basis for demonstration or noninvasive procedures. R. Rawson and staff. This course is designed to develop students' understanding of how an animal maintains itself as a functional organism; 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 531 Function and Dysfunction: Part II (Foundation Course Illb)
Fall. 7 credits. Limited to second-year veterinary students. Prerequisite: VTMED 530. Function and Dysfunction: Part I. Letter grades only. R. Rawson and staff. A continuation of VTMED 530, Function and Dysfunction: Part I.

VTMED 537 Animals, Veterinarians, and Society: Part C (Foundation Course Vllc)
Spring. 1 credit. Limited to first-year veterinary students. Prerequisite: VTMED 527. Animals, Veterinarians, and Society: Part B. Letter grades only. A fee is charged for the course guide. Live animals will be used in course instruction. N. L. Irby. The primary focus of this course is to introduce students to communication skills and techniques necessary for effective communication with clients. In addition, students will be 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 will be provided through a milking experience at the college's dairy barn.

VTMED 540 Host, Agent, and Defense (Foundation Course IV)
Fall. 12 credits. Limited to second-year veterinary students. Prerequisite: VTMED 531. Function and Dysfunction: Part II. Letter grades only. D. Bowman (course leader) and others. This course is divided into six sections: the host response, intracellular environment, extracellular environment, somatic environment, external environment, and surrounding environment. Using this approach, students develop an understanding of the host response to insult, a familiarity with groups of important pathogens, an understanding of how pathogens manipulate the host and how the host defends itself against attacks, and an understanding of the roles played by the external environment and human intervention in the epidemiology of infectious organisms.

VTMED 541 Animal Health and Disease: Part I (Foundation Course V)
Fall. 10 credits. Limited to second-year veterinary students. Prerequisite: VTMED 540. Host, Agent, and Defense. Letter grades only. R. Hackett. This course continues the discussion of infectious diseases presented in VTMED 517, Animals, Veterinarians, and Society: Part D (Foundation Course V, continued). Emphasis will be placed on the principles of diagnosis and treatment of infectious diseases with an emphasis on infectious diseases of the skin, tissues, organs, and body fluids. The course will also include a discussion of neoplasia and its management. The course will conclude with a discussion of the special diagnostic and treatment challenges associated with the diagnosis and treatment of infectious diseases in horses.

VTMED 542 Small Animal Clinical Oncology
Spring. 1 credit. Limited to second-year veterinary students. Prerequisite: VTMED 541. Animal Health and Disease: Part II. Letter grades only. A. P. Scagliotti. This course will provide an overview of the field of small animal clinical oncology. The course will begin with an introduction to the basic principles of oncology, including an overview of cancer biology and an introduction to the components of the veterinary oncology team. The course will then cover the diagnosis, treatment, and management of common cancers affecting small animals, including the role of surgery, chemotherapy, radiation therapy, and immunotherapy in the treatment of cancer. The course will also address the special challenges associated with the diagnosis and treatment of cancer in small animals, including the importance of early detection and the role of preventive care in cancer management.

VTMED 550 Animal Health and Disease: Part II (Foundation Course VII)
Spring. 3 credits. Limited to first-year veterinary students. Prerequisite: VTMED 540. Animal Health and Disease: Part I. Letter grades only. A. P. Scagliotti. This course is designed to introduce students to the study of animal diseases, with an emphasis on the role of the veterinarian in the diagnosis and treatment of these diseases. The course will cover a wide range of topics, including infectious diseases, neoplasms, and inflammatory disorders. The course will also cover the role of the veterinarian in the diagnosis and treatment of animal diseases, with an emphasis on the importance of a thorough history and physical examination, the use of diagnostic tests, and the development of a treatment plan.

VTMED 551 Animal Health and Disease: Part III (Foundation Course VIII)
Spring. 1 credit. Limited to second-year veterinary students. Prerequisite: VTMED 550. Animal Health and Disease: Part II. Letter grades only. A. P. Scagliotti. This course is designed to continue the discussion of infectious diseases presented in VTMED 541, Animal Health and Disease: Part I. Emphasis will be placed on the principles of diagnosis and treatment of infectious diseases with an emphasis on infectious diseases of the skin, tissues, organs, and body fluids. The course will also include a discussion of neoplasia and its management. The course will conclude with a discussion of the special diagnostic and treatment challenges associated with the diagnosis and treatment of infectious diseases in horses.
This is a laboratory course that provides a basic instruction to clinical skills students will need when they start the clinical rotations in the Cornell University Hospital for Animals. There is a brief review of the physical examination of the dog, horse, and cow. Clinical procedures include but are not limited to cardiology, blood pressure, and treatment and IV and IM injections, fluid administration, naso- and orogastric tube placement, urinary catheterization, and IV catheterization.

VTMED 558 Animals, Veterinarians and Society: Part F (Foundation Course VIII)
Fall, 1.5 credits. Limited to third-year veterinary students. Prerequisite: VTMED 557, Animals, Veterinarians, and Society. Part E. Letter grade only. A fee is charged for the course. Guide: Live animals are used in course instruction: N. L. Irby.

This course complements material learned in VTMED 551 (Foundation Course V—Animal Health and Disease). The course examines governmental regulation of the veterinary profession, including proper drug usage, extra label drug use (EPLDA), controlled substances (DEA), professional liability and malpractice insurance, professional and unprofessional conduct, hazardous materials in the workplace (OSHA), and environmental issues (EPA). Also included are 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 one night in the Equine and Farm Animal Hospital.

VTMED 560 Ambulatory and Production Medicine I
Fall, winter, spring, and summer. 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. M. E. White and staff.

A total of four weeks of Ambulatory and Production Medicine are required. VTMED 565 is taken during the clinical rotations in the third or fourth year. VTMED 560 is also given during the third or fourth year; however, first- and second-year students are encouraged to take one or two weeks of this course over winter recess or during the summer if slots are available. A lottery is done to assign first- or second-year students to the available slots. See VTMED 565 for course description.

VTMED 561 Community Practice Service: Medicine
Fall, winter, spring, and summer. 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. W. E. Hornbeck and staff.

The Community Practice Medicine Service is structured to provide supervised clinical experience in the practice of companion small-animal medicine. The course is conducted in the Companion Animal Hospital of the Cornell University Hospital for Animals. Students interact directly with clients presenting their pets for primary or referral medical care. Under the supervision of the clinical faculty and staff, the students are expected to formulate and carry out plans for the diagnostic evaluation and medical management of these patients. Students assigned to this service assist the faculty and house staff 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, 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.

VTMED 562 Large-Animal Surgery Service
Fall, winter, spring, 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.

The Small-Animal Medicine Service is structured to provide supervised clinical experience in the practice of companion small-animal medicine. The course is conducted in the Companion Animal Hospital of the Cornell University Hospital for Animals. Students participate directly with clients presenting their pets for primary or referral medical care. Under the supervision of the clinical faculty and staff, the students are expected to formulate and carry out plans for the diagnostic evaluation and medical management of these patients.

VTMED 563 Small-Animal Medicine
Fall, spring, and summer. 4 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.

A clinical service rotation, this course exposes the student to the practice of surgery under hospital conditions. Students participate in the diagnostic techniques, planning of surgery, and daily care of dogs, cats, and exotic species under the direction of a faculty veterinarian. Students assist experienced surgeons in the operating room, and with house-officer supervision, are responsible for patients undergoing elective ovariohysterectomy or castration. Client communications and the basics of efficient practice are emphasized.

VTMED 564 Small-Animal 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.

This rotation provides clinical experience in the use of anesthetics in small companion animals, horses, and some food animals. The 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 565 Ambulatory and Production Medicine II
Fall, winter, spring, and summer. 2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. M. E. White and staff.

A clinical rotation in which students accompany ambulatory veterinarians on farm and stable calls to practice the skills and procedures necessary for operation of a modern veterinary practice offering primary care to large-animal clients. Routine herd-health visits are conducted for cattle, horses, sheep, goats, and swine. Reproductive evaluations (including pregnancy and fertility examinations), nutritional evaluation, and disease prevention are stressed. Herd-health programs also include vaccinations, parasite control, mastitis prevention, and routine procedures. With appropriate herds, analysis of computerized performance data is conducted and discussed with the owner. In addition to assisting with routine scheduled work, students participate in diagnosis and medical or surgical treatment of ill or injured animals. This includes rotating assignments for night and weekend duty.

VTMED 566 Large-Animal Medicine Service
Fall, winter, spring, and summer. 3 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. D. Ainsworth, T. Divers, G. Perkins, and M. Flaminio.

Students assigned to this service assist the faculty and house staff 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...
VTMED 571 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.
This course involves the hands-on diagnostic necropsies of most mammalian species that are presented to the pathology necropsy room and of avian species that are admitted to the avian and aquatic-animal medicine necropsy room. Students work in groups of three to five for the rotation. Necropsies are performed under the guidance of pathology faculty and residents. Students prepare written reports of necropsies performed, review microscopic hematology and cytology slides, perform urinalyses, and discuss case studies.

VTMED 572 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.
A two-week clinical experience in the imaging section of the Cornell University Hospital for Animals is included. Students are exposed to radiographic, CT-ultrasonographic, and nuclear-medicine imaging techniques to evaluate animal patients under treatment in the hospital. 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 radiosotopes is discussed.

VTMED 573 Fourth-Year Seminar
Fall and spring. 1 credit. Required component of Clinical Rotations (Foundation Course VI). First-, second-, and third-year veterinary students and all staff members are also invited and encouraged to attend. S-U grades only. F. H. Fox, chair of the Senior Seminar Committee.
The aim of this course is to give 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.

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 year, many of the distribution courses are oriented to the basic sciences. During years three and four, students have additional distribution course offerings from which to choose. Some emphasize clinical specialties, whereas others integrate basic-science disciplines with clinical medicine and are co-taught by faculty representing both areas. Students from different classes have the opportunity to take many of these courses together.

Grades: grading options for distribution courses are either letter or S/U.

VTMED 501 The Animal Body or permission of instructor. First-, second-, third-, and fourth-year veterinary students; others by permission. Letter grades only. A. J. Bezzi and staff.
Carnivore anatomy is studied by detailed systematic and regional dissection of the cat, with comparison to the dog. Students dissect supplemented with presections, radiographs, models, preserved specimens, and through discussions. Functional consequences of structural modifications and anatomical features relevant to clinical practice are emphasized. Microscopic anatomy is correlated with gross anatomy when appropriate to elucidate structure to function and to provide a foundation for later study in pathology. Student dissection material is supplemented by skeletal materials, radiographs, models, dissected specimens, and preserved specimens. Students are required to complete an independent study project on the carnivore species of their choice and give an oral presentation on this to the class.

VTMED 502 Anatomical and Histological Fundamentals of Natural History
Spring. 3 credits. Prerequisite: VTMED 510, The Animal Body or permission of instructor. First-, second-, third-, and fourth-year veterinary students; others by permission. Letter grades only. K. A. Hembree.
This course is 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 is directly relevant to clinical practice is emphasized in the regional approach to dissection. Emphasis is placed on 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 study of the gross anatomy alone (i.e., hoof). Students dissect cadavers are supplemented by skeletal materials, radiographs, models, preserved specimens, and fresh specimens when they are available.

VTMED 503 Anatomy of the Ruminant
Spring. 3 credits. Prerequisite: VTMED 510, The Animal Body or permission of instructor. First-, second-, third-, and fourth-year veterinary students; others by permission. Letter grades only. J. Hermanson.
The regional anatomy of several ruminant species is covered using dissection laboratories, lectures, and large-group discussions. Functional consequences of structural modifications and anatomical features relevant to clinical practice are emphasized. Microscopic anatomy is correlated with gross anatomy when appropriate to elucidate structure to function and to provide a foundation for later study in pathology. Student dissection material is supplemented by skeletal materials, radiographs, models, dissected specimens, and preserved specimens. Students are required to complete an independent study project on a relevant subject of their choice. Assessment includes written and practical examination.

VTMED 504 Comparative Anatomy: Pattern and Function
Spring. 3 credits. Prerequisite: VTMED 510, The Animal Body. First-, second-, third-, and fourth-year veterinary students; others by permission. Letter grades only. A. M. Maza.
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 505 Advanced Clinical Neurology
Spring. 1 credit. Prerequisite: VTMED 521, Neuroanatomy and Clinical Neurology. Third- and fourth-year veterinary students. Letter grades only. A. deLahunta.
The objective of this course is to further the student's understanding of neural anatomy, physiology, and pathology in the diagnosis of diseases of the central nervous system and the understanding of their pathogenesis. Neurological disorders that are not covered in the foundation course are considered here. The course is based entirely on case examples that are presented on videotapes and slides.

VTMED 506 The Literature and Subject Matter of Natural History
This course is an introduction to natural history literature. Materials relating to the earth sciences and the biology of plants and animals from around the world are shown and discussed. 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 for this course is The Cambridge Illustrated Dictionary of Natural History by R. J. Lincoln and G. A. Boxshall, 1990.)

VTMED 507 Anatomy and Histology of Fish
Spring. 2 credits. Minimum enrollment 4; maximum enrollment 6. First-, second-, third-, and fourth-year veterinary students, others by written permission of instructor. S-U grades optional. P. R. Bowser.
This course 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 508 Veterinary Aspects of Avian Biology
Spring. 1.5 credits. Minimum enrollment 4; maximum enrollment 6. First-, second-, third-, and fourth-year veterinary students, others by written permission of instructor. S-U grades optional. L. A. Mizer.

An introduction to avian biology for veterinary students. The course includes lectures and laboratories involving avian anatomy.
VTERM 613 AQUAVET I: Introduction to Aquatic Veterinary Medicine

Four weeks of full-time instruction at Woods Hole, Massachusetts. Immediately after the spring term. 4 credits. Maximum enrollment 24 students from Cornell University, the University of Pennsylvania, and other U.S. colleges and schools of veterinary medicine. Available, by a competitive application process, to veterinary and graduate students. S-U grades only. Course fee required. P. R. Bowser.

This course is sponsored by Cornell University, the University of Pennsylvania, and the marine science institutions at Woods Hole: the Marine Biological Laboratory, Woods Hole Oceanographic Institute, and Northeast Center of the National Marine Fisheries Service. It is designed to introduce veterinary students to aquatic-animal medicine. The marine environment is described and visited on field trips in the Woods Hole area. Specific aspects of the comparative anatomy, physiology, nutrition, microbiology, pathology, and medicine of a variety of marine and freshwater species are discussed. Some emphasis is placed on systems of aquaculture. The specific diseases of a few selected species are presented as case examples, including the diseases of a crustacean, a shellfish, a finfish, and marine mammals. The course is taught by an invited faculty of 35 individuals who are leaders in their respective fields of aquatic-animal medicine. Students present seminars on appropriate topics.

VTERM 614 AQUAVET II: Comparative Pathology of Aquatic Animals

Two weeks of full-time instruction at Woods Hole, Massachusetts. Immediately after the spring term. 2 credits. Prerequisites: formal course work in diseases of aquatic animals or appropriate experience and permission of instructor. Maximum enrollment 18. S-U grades optional. Course fee required. Available, by a competitive application process, to veterinary and graduate students. P. R. Bowser.

This course is sponsored by Cornell University, the University of Pennsylvania, and three marine-science institutes at Woods Hole: the Marine Biological Laboratory, Woods Hole Oceanographic Institution, and Northeast Center of the National Marine Fisheries Service. It is an advanced course in the comparative pathology of aquatic 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.

VTERM 615 Veterinary Medicine in Developing Nations

Spring. 2 credits. Maximum enrollment 20. First-, second-, third-, and fourth-year veterinary students or others by permission of instructor. S-U grades only. Offered even-numbered years, will be offered in 2006. R. A. Schat.

Veterinary medicine has an important role to play in developing nations in developing and providing a broad spectrum 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.

VTERM 616 Diseases of Birds

Spring. 2 credits. Minimum enrollment 10; maximum enrollment 80. Second-, third-, and fourth-year veterinary students. Letter grades only. G. V. Kollias and staff.

This course is 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. The course emphasizes the latest diagnostic and control approaches. The course format is a combination of didactic lectures and discussions.

VTERM 617 Basic Nutrition for Veterinary Students

Fall. 1 credit. Prerequisite: Block III (VTERM 531). S-U grades only. F. A. Kallfelz, J. J. Walschlag, and K. J. Harley.

This course provides an introduction to nutrition, including basic concepts of the need for and metabolism of energy, protein, minerals, and vitamins in domestic animals. The functions of essential nutrients, including differences between nutrients needed in herbivores, carnivores, and omnivores, are discussed. Identification and use of various forages and concentrates for large animal feeding are included.

VTERM 622 Foreign Infectious Diseases of Animals


This course describes the etiology, pathogenesis, gross pathology, differential diagnosis, methods of spread, reservoir hosts, and control of foreign animal diseases that present serious economic threats to the United States. The format is student-seminar with each student responsible for presenting one seminar or writing a paper on the outcome of a foreign animal disease outbreak. The recent spread of FMD, West Nile virus, and BSE emphasizes the importance these diseases have to producers, consumers, and practicing veterinarians. Ordinarily the course also includes presentations by college faculty and research scientists working on foreign infectious diseases.

VTERM 624 Feline Infectious Diseases

Spring. 1 credit. Minimum enrollment 10; maximum enrollment 80. Second-, third-, and fourth-year veterinary students. Letter grades only. S. C. Barr.

The course consists of two 50-minute lecture periods a week for eight weeks. The letter grade is obtained entirely from the result of a written examination (usually multiple-choice format) given in the final period. The course emphasizes the clinical aspects of feline infectious diseases common to cats in North America and complements knowledge acquired in Blocks 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 signs, 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.

VTERM 625 Osteoarthritis


This course provides a basis at the molecular, cellular, and tissue levels for understanding the function of mammalian diarthrodial joints. It includes a description of a diarthrodial joint and the composition and metabolism of articular cartilage, subchondral bone, and ligaments. The interrelationships of synovium, synovial fluid, articular cartilage, joint lubrication, biomechanical considerations, and enervation are considered. Canine hip dysplasia is a focus during the early sessions. The course examines osteoarthritis that is associated with canine hip dysplasia serves as a basis for discussion of the etiopathogenesis of the disease. Canine osteoarthritis is emphasized, but the disease in animal models such as pigs, rabbits, and sheep is mentioned. Therapies such as nonsteroidal anti-inflammatory drugs, glucocorticoids, and others may be discussed.

VTERM 626 Epidemiology of Infectious Diseases


This course introduces the epidemiologic methods used in infectious disease investigations. The importance of surveillance systems in detecting emerging and ongoing diseases and in the development of effective disease prevention and control strategies are also discussed. An emphasis is placed on understanding the relationships between the host, the agent, and the environment as they relate to disease causation. The course explores contemporary epidemiologic applications to old diseases that remain real or potential problems, newly emerging infectious diseases, and vector-borne infectious diseases. 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.

VTERM 628 Clinical Pathology


This six-week course addresses a range of issues related to laboratory medicine and interpretation of laboratory results. General topics 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 Blocks III and IV and also provides additional experiences in practical clinical pathology procedures and microscopy.

**VTMED 630 Clinical Biostatistics for Journal Readers**
Spring. 1 credit. Minimum enrollment 4; maximum enrollment 12. First-, second-, third-, and fourth-year veterinary students; others by permission of instructor. Letter grade. H. N. Erb.

This course is considered to be a logical extension to the foundation course, Host, Agent, and Defense, and is expected to build on the didactic material presented in Large- and Small-Animal Parasitology.

Students will become familiar with the statistical methods commonly used in veterinary clinical articles, become able to recognize obvious misuse of those methods, and become able to interpret the statistical results.

**VTMED 631 Clinical Diagnostic Parasitology**
Fall and spring. 0.5 credit. Prerequisite: VTMED 551. Third- and fourth-year veterinary students. S-U grades only. TBA with M. K. Fongello and D. D. Bowman.

This course provides a chance to perform diagnostic parasitology methods using samples obtained from ongoing clinical cases. Students attend eight 1-hour sessions as they rotate through the community practice, and pathology rotations. In the Ambulatory Service (four sessions with students), diagnostics concentrates on the laboratory examination of samples from large-animal cases that have been observed during the previous week. In the Community Practice Service, one hour concentrates on the examination of samples from ongoing cases, while a second hour consists of a discussion of the treatment of common parasitoses. The two hours spent as part of the pathology rotation examine methods of recovering parasites from pathology specimens, including the examination of wet preparations and the digestion of tissues for parasite recovery. The course is considered to be a logical extension to the foundation course, Host, Agent, and Defense, and is expected to build on the didactic material presented in Large- and Small-Animal Parasitology.

**VTMED 632 Senior Seminar**
Spring and fall. 1 credit. First-, second-, and third-year veterinary students. S-U grades only. Must be completed in two consecutive terms (either spring to fall or fall to spring). R. O. Gilbert.

Attendance at 14 of the senior seminar sessions presented during the academic year constitutes acceptable completion of this course. This course does not fulfill the 1-credit Set VII minimum.

**VTMED 635 Introduction to the Professional Literature**

This course 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. Some emphasis is on developing skills in library and bibliographic research techniques and strategies for personal information management, as well as exploring the use of veterinary-related on-line information.

**VTMED 637 Introduction to Community Practice Service**
Fall, winter, spring, and summer. 1 credit. First- and second-year veterinary students by permission of instructor. S-U grades only. W. E. Hornbuckle.

This course 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 examination, and routine treatment of pets and communication with clients. Successful completion requires satisfactory participation during 10 half-days of clinical service.

**VTMED 638 Veterinary Nutrition**
Spring. 2 credits. Minimum enrollment 10; maximum enrollment 90. Second- and third-year veterinary students; others by permission of instructor. Letter grades only. F. A. Kallfelz.

The first half of this course provides information on the requirements for and utilization of the 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 requirements, growth, adult maintenance, gestation, lactation, aging, performance, and production. The second half covers clinically relevant diseases of nutritional deficiency and excess, including obesity, endothelial dysfunction, cardiac, G-I, hepatic, and musculoskeletal system disease. Other topics include the role of nutrition in managing cancer and hypersensitivity disorders and in critical care, including enteral and parenteral nutrition. The course also includes an introduction to nutrition for exotic and zoo animals. This course is recommended for second- and third-year veterinary students.

**VTMED 640 Veterinary Aspects of Captive Wildlife Management**
Spring. 2 credits. Minimum enrollment 40. First-, second-, third-, and fourth-year veterinary students. Letter grades only. G. V. Kollias.

This course concentrates on principles of captive wildlife management, both clinical and nonclinical. Students are challenged to learn and integrate a variety of disciplines that are essential to managing wildlife successfully in a captive or semi-free-ranging environment. These disciplines include but are not limited to species-specific 1) behavior and behavioral requirements, 2) nutritional requirements and problems, 3) natural history, 4) zoozotic and toxological 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 (examples include African, Asian, Australian, and Central and South American species), and in odd-numbered years the course focuses more on the North American (native) wildlife species.

**VTMED 641 Approaches to Problems in Canine Infectious Diseases**
Spring. 1 credit. Minimum enrollment 10; maximum enrollment 80. Second-, third-, and fourth-year veterinary students. Letter grades only. S. C. Barr.

The course consists of two 50-minute lecture periods each week for eight weeks. The letter grade is obtained entirely from the result of a written examination (usually multiple-choice format) given in the final period. The course emphasizes the clinical aspects of the more common canine infectious diseases. The overall objective is to provide details about specific infectious diseases a future small-animal practitioner may need to know to effectively diagnose and treat these diseases. Clinical signs, presentation, clinicopathologic data, diagnostic choices, treatment plans, and prevention are emphasized. Most lectures are presented by clinical faculty and therefore the material is oriented toward practical skills in managing clinical cases.

**VTMED 642 Management of Fluid and Electrolyte Disorders**

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 acidoses, metabolic alkalosis, and mixed acid-base disturbances.

**VTMED 643 Fundamental Aspects of Embryo Transfer**
Spring. 1 credit. Minimum enrollment 16. Enrollment is done by lottery. Third- and fourth-year veterinary students or graduate students by permission of instructor. S-U grades only. Staff.

This course introduces the theory and practice of embryo transfer in domestic animals. Topics include background, advantages and disadvantages, superovulation, embryo recovery, culture, manipulation, embryo transfer techniques, registration of offspring, import and export, and related topics in assisted reproductive technologies. Students are expected to practice the techniques of embryo transfer in cattle, small ruminants, horses, and swine. The course consists of lectures, demonstrations, and laboratory classes during which students practice techniques of embryo recovery, evaluation, handling, and transfer.

**VTMED 644 Equine Surgical and Anesthetic Techniques**
Winter. 1 credit. Prerequisite: VTMED 602, Anatomy of the Horse. Minimum enrollment 7; maximum enrollment 21. Enrollment is done by lottery. Third- and fourth-year veterinary students. S-U grades only. S. Fuhrin (coordinator) and other large-animal surgeons.

This course 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. This course is offered during a one-week period over winter intersession.
VTMED 645 Food-Animal Surgical and Anesthetic Techniques
Winter. 1 credit. Prerequisite: VTMED 603, Anatomy of the Ruminant. Minimum enrollment 60; maximum enrollment 21.
Third- and fourth-year veterinary students. S-U grades only. Enrollment is done by lottery. S. Fubini and other large-animal surgeons.
This course consists of five laboratories performing surgical procedures on sheep, calves, cadaver specimens, and adult cattle. It is the intent of this course not to make the students proficient in these procedures but to familiarize them with surgical techniques and to make them more enlightened referring practitioners. The course, therefore, is intended for students anticipating food-animal practice after graduation. This course is offered during a one-week period over winter intersession.

VTMED 646 Llama Tutorial
This autotutorial or group tutorial course covers 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 647 Poisonous Plants
Fall. 1 credit. First-, second-, third-, and fourth-year veterinary students; others by 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 include the following: cyanogenic glycosides, cyanide, oxalates, photodynamic agents, alkalioids, and mycotoxins.

VTMED 648 Clinical Management of Native Wildlife
Fall, spring, summer (credit given in fall). 1 credit. Enrollment not to exceed 50 students per semester. First-, second-, third-, and fourth-year veterinary students. Letter grades only. G. V. Kollias and staff.
This course 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 Hospital for Animals by those in the Cornell wildlife rehabilitators. Student activities are directly supervised and assessed by faculty and residents on a daily basis. Successful completion of the course requires 40 hours of satisfactory supervised participation per semester in the clinic. Clinics are appropriately scheduled throughout the semester. Students are required to submit two case summaries, or alternatives approved by the course leader, before the end of the semester and a log of their clinical hours.

VTMED 649 Introduction to Equine Practice
Spring. 0.5 credit. Maximum enrollment 30. First- and second-year veterinary students. Letter grades only. R. Hackett and C. Collyer.
This is an introductory course in equine husbandry intended for students with little or no experience working with horses. Lecture topics include horse care, housing facilities and fencing, and overview discussions of the racing, showing, and breeding industries. Laboratories emphasize basic equine handling and restraint as well as feeds and bedding.

VTMED 652 Avian Medicine and Surgery
Spring. 2 credits. Minimum enrollment 20; maximum enrollment 40. Third- and fourth-year veterinary students. Letter grades only. G. V. Kollias and staff.
This course is designed to introduce third- and fourth-year veterinary students to the principles and practice of avian medicine and surgery. The course is taught in a basic didactic lecture and discussion format with laboratories that reinforce concepts presented in the lectures. Live birds are used in some of the laboratories.

VTMED 653 Advanced Equine Lameness
This course is designed to help students understand the methodology and to develop the manual skills required for lameness examination in horses. Emphasis is on developing diagnostic skills. Specifically, students are expected to develop proficiency in the identification of clinical characteristics associated with recognized lamenesses and to localize the origin of the lameness. Teaching aids include video modules outlining various gait abnormalities in horses, with specific gait abnormalities being available for physical, radiographic, and ultrasonographic examination.

VTMED 654 Equine Theriogenology
Spring, Lec, 1 credit; lab, 0.5 credit. Lab minimum enrollment 12; maximum enrollment 24. Laboratory enrollment is done by lottery, if oversubscribed; concurrent enrollment in lecture is required. Third- and fourth-year veterinary students. Letter grades only. D. H. Volkman.
This course covers advanced aspects of equine reproductive physiology. Reproductive management of mares and stallions using natural and artificial breeding strategies is discussed. Diagnosis, treatment, and prevention of common reproductive disorders are stressed. The laboratory component builds on skills acquired during foundation courses and provides experience in techniques important in equine theriogenology.

VTMED 655 Dairy Cow Theriogenology
Spring, Lec, 1 credit; lab, 1 credit. Lab, minimum enrollment 12; maximum enrollment 24. Laboratory enrollment is done by lottery. Concurrent enrollment in Dairy Cow Theriogenology Lecture is required. Third- and fourth-year veterinary students. Letter grades only. D. Volkman and R. Gilbert.
This course 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 656 Special Problems in Equine Medicine
Spring. 1.5 credits. Minimum enrollment 10; maximum enrollment 30. Enrollment is done by lottery. Third- and fourth-year veterinary students. S-U grades only. T. Divets and staff.
This course is intended for students anticipating equine practice. In-depth study of important diseases, review of recent literature, health management, and hands-on procedures or demonstrations are the core of this course.

VTMED 657 Disorders of Large-Animal Neonates
Spring. 1 credit. Minimum enrollment 100. First-, second-, third-, and fourth-year veterinary students. Letter grades only. G. Perkins.
This is an introductory neonatology course taught to first- to fourth-year veterinary students. 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 will also spend several hours in the neonatal intensive care unit providing medical care of hospitalized patients under staff supervision.

VTMED 658 Equine Soft-Tissue Surgery
Spring. 1 credit. Minimum enrollment 6; maximum enrollment 24. Third- and fourth-year veterinary students. Enrollment is done by lottery. Letter grades only. R. Hackett and staff.
This course, 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, prepartum examination). Laboratories emphasize diagnostic and therapeutic procedures in which an entry-level equine practitioner should be competent.

VTMED 661 Surgical Pathology
Spring, summer, fall. Variable 1-2 credits. Second-, third-, and fourth-year veterinary students with permission of instructor. Letter grades only. S. McDonough.
This one- or two-week course (approximately eight hours per day for one credit per week) provides hands-on experience in the Surgical Pathology Sequence of the Department of Biomedical Sciences. Working with the attending pathologist, students examine tissue specimens histologically, propose diagnoses, and discuss their interpretations. Students may enroll in this course only through the Office of Student Records within the official add/drop period. All requests to enroll must be accompanied by the Supplemental Enrollment Form indicating Dr. McDonough's approval of the enrollment and the amount of credit to be awarded. Second-year students should not enroll for any term other than summer unless they have actually reserved a January or spring-break slot through Dr. McDonough.
VTMED 665 Medical and Surgical Problems of Dairy Cattle: Emphasis on the Individual Animal
Spring. 1.5 credits. Minimum enrollment 6; maximum enrollment 28. Third- and fourth-year veterinary students. Letter grades only. S. Fuhini and staff. This course provides students who have a special interest in dairy practice the opportunity for in-depth discussions of special problems in bovine medicine and surgery. Emphasis is on case discussions, physical examination techniques, and ethical and practical matters. The course emphasizes individual cow treatment.

VTMED 667 Special Problems in Small-Animal Medicine
Spring. 1 credit. Minimum enrollment 10; maximum enrollment 40. Third- and fourth-year veterinary students. S-U grades only. K. Simpson (coordinator) and staff. During the four-week course, students work through 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 histologic and pathologic principles of disease. The overall objective is to give future small-animal practitioners skills in the approach to clinical problems with specific emphasis placed on history taking, clinical signs and examination skills, assessment of clinical pathology data and diagnostic materials (radiographs, ultrasounds), treatment plans, and prevention. The course expands knowledge gained in Foundation Course V and, under the instruction of a clinical faculty member, is aimed at facilitating the use of this knowledge into the practical skills of managing clinical cases.

VTMED 668 Practice Management
Spring. 2 credits. Number of sections will be determined by enrollment. Second-, third-, and fourth-year veterinary students. S-U grades only. J. Ludders, J. Morrissey, and K. Cummings. Course participants form a veterinary group practice that includes the specialties of each person’s interest. Topics are presented and discussed including the legal and ethical issues of the practice. Topics include basic practice organization, leadership styles, career planning, communication skills, facility management, human resource management, maintenance of standards, marketing and merchandising, building and maintaining clients, practice growth, finances, computing systems and information management, money management, legal issues and insurance, professional responsibility, and maintaining an acceptable quality of life, including stress management. Various practitioners and practice managers speak to the group about their very different successful practices, concentrating on management and organizational skills.

VTMED 669 Sheep and Goat Medicine
Spring, Lec. 1 credit; lab, 0.5 credit. Lab section requires concurrent enrollment in Sheep and Goat Medicine Lecture. Third- and fourth-year veterinary students. S-U grades only. M. C. Smith. This course deals with the diagnosis, treatment, and prevention of medical and surgical problems of individual small ruminants and of sheep and goat herds. Basic information on breeds, behavior, nutritional requirements, and management systems is supplied. Economically important contagious or metabolic diseases are discussed in depth. The diagnostic evaluation and differential diagnoses for common clinical presentations such as skin disease, neurologic disease, lameness, and mastitis are addressed. Breeding systems, pregnancy diagnosis methods, correction of dystocia, and common surgical procedures are discussed and demonstrated in laboratory sessions.

VTMED 670 Drug Handling in the Body
Spring. 0.5 credit. Maximum enrollment 60. Second-, third-, and fourth-year veterinary students. Letter grades only. R. A. Cerone and G. A. Weiland. This course provides an in-depth consideration of the pharmacological principles of administration, absorption, distribution, metabolism, and elimination of drugs. Emphasis is on the conceptual basis of the pharmacokinetic considerations in the therapeutic use of drugs. The course builds on the pharmacological and physiological principles introduced in Foundation Course III.

VTMED 671 Autonomic Pharmacology
Spring. 0.5 credit. Maximum enrollment 80. Second-, third-, and fourth-year veterinary students. Letter grades only. G. A. Weiland. This course provides an in-depth consideration of the pharmacological and physiological principles of autonomic pharmacology. Molecular, cellular, and organ-system mechanisms are emphasized. The course explores in more detail the fundamental pharmacological and physiological principles of the effects of drugs on autonomic organs introduced in Foundation Course III.

VTMED 672 Antimicrobial Drug Therapy in Veterinary Medicine
Spring. 1 credit. Second-, third-, and fourth-year veterinary students. Letter grades only. W. S. Schwark. The objective of this course is to familiarize students with antimicrobial drugs used in veterinary practice. The course builds on fundamental pharmacological and microbiological principles covered in Foundation Courses III and IV, and includes considerations of drug interactions, infections, noninfectious causes of disease, and potential side effects of antimicrobial drugs. The course is offered at the clinical level and uses ongoing cases in the clinical setting and uses ongoing cases in the clinical setting.

VTMED 673 Veterinary Ophthalmology
Spring. 1 credit. Third- and fourth-year veterinary students. S-U grades only. S. A. Cerione. This course is offered after Blocks I-V and formal exposure to pharmacology course work is completed. The course is designed to familiarize students with drugs used in the clinical setting and uses ongoing cases in the Cornell University Hospital for Animals as a teaching tool. Pharmacological concepts are emphasized, with a focus on the rationale for drug choice, alternative drug choices available, pharmacokinetic considerations, and potential drug interactions/toxicities. The course is offered at the clinical level and uses ongoing cases in the clinical setting.

VTMED 674 Clinical Ophthalmology
Spring. 0.5 credit. Third- and fourth-year veterinary students. S-U grades only. R. Riis, N. Irby, and T. Kern. The principles and practice of entry-level veterinary ophthalmology introduced in Block 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 laser surgical techniques performed on cadaver tissues.

VTMED 675 Dairy Production Medicine
Fall. 2 credits. Minimum enrollment 6; maximum enrollment 14. Third- and fourth-year veterinary students. S-U grades only. C. Guard. This is an intermediate course in the techniques and procedures used by veterinarians in modern dairy practice. Many of these activities fall outside the traditional boundaries of medicine, surgery, and theriogenology and might include housing, facilities, manure management, and employee education. Data analysis, disease and productivity monitoring, and evaluation of deviations from targeted performance are used to plan cost-effective interventions or corrections, followed by continued surveillance to monitor their effect. Students are introduced to the dominant software currently used in dairy management. Local dairy herds serve as additional laboratories for class projects.

VTMED 676 Small-Animal Theriogenology
Spring. 1 credit. Minimum enrollment 6; maximum enrollment 100. Third- and fourth-year veterinary students. Letter grades only. D. H. Volkman. This is a distribution 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 techniques, infectious and noninfectious causes of infertility, and pathology of the male and female reproductive tracts, their diagnosis, and management. The emphasis of the course is on conditions affecting dogs and cats.

VTMED 677 Clinical Pharmacology
Spring. 0.5 credit. Third- and fourth-year veterinary students. S-U grades only. W. S. Schwark. This course is offered after Blocks I-V and formal exposure to pharmacology course work is completed. The course is designed to familiarize students with drugs used in the clinical setting and uses ongoing cases in the Cornell University Hospital for Animals as a teaching tool. Pharmacological concepts are emphasized, with a focus on the rationale for drug choice, alternative drug choices available, pharmacokinetic considerations, and potential drug interactions/toxicities. The course is offered at the clinical level and uses ongoing cases in the clinical setting.

VTMED 678 Behavior Problems of Horses
Spring. 1 credit. Prerequisite: one semester of veterinary curriculum. First-, second-, third-, and fourth-year veterinary students. S-U grades only. K. A. Houpt. The goal of this course is to give veterinary students the ability to treat the behavior problems of horses. History-taking, counseling, diagnostic tests, follow-up, the importance of cooperation with the referring veterinarian, prevention of behavior problems, training techniques of value to the practitioner, and socialization of foals are presented.
VTMED 681 Behavior Problems of Small Animals
The goal of this course is to give veterinary students the ability to treat the behavioral problems of cats and dogs. History-taking, counseling, and follow-up methods are presented. Each student has the opportunity to participate in three cases. Behavioral and pharmacological treatments for behavior problems are presented.

VTMED 682 Topics in Veterinary Emergency and Critical Care Medicine
Spring. 1 credit. Minimum enrollment 20. Third- and fourth-year veterinary students, all others need instructor approval. S-U grades optional. N. Dhupa.
This course provides an introduction to emergency and critical care medicine, covering one to three topics per week. Although all of the discussions center on small animal medicine, the same principles often apply to both small and large animal situations. Topics that might be covered include a selection from the following list: triage, shock, trauma, stabilization, cardiopulmonary resuscitation, respiratory emergencies, cardiac emergencies, heat stroke; toxicoses, endocrine emergencies, acute renal failure, hemotologic emergencies, transfusion medicine, respiratory monitoring, hemodynamic monitoring, acute abdomen, emergency surgical procedures, and sepsis.

VTMED 692 Current Concepts in Reproductive Biology (also BIOAP 757)
Fall. 3 credits. Minimum enrollment 6. First-, second-, and third-year veterinary students or appropriate undergraduate/graduate training. Letter grades only. Lec. 2 hours each week, disc. 2 hours each hour. T R 10:10-12:05. Offered odd-numbered years. J. Fortune, W. R. Butler, and staff.
This is a team-taught course in reproductive biology and endocrinology. Lectures are given by a number of reproductive biologists on various aspects of male reproductive function (endocrine regulation, testis function, spermatogenesis, and sperm physiology/function); female reproductive function (endocrinology, ovarian development and function, oocyte physiology/function); fertilization and early embryo development; pregnancy; parturition; puberty; and reproductive technology. Students participate in the form of discussions and/or presentations.

VTMED 695 Genetic Basis of Eye Diseases
This course covers the molecular and genetic basis of inherited eye diseases in domestic and laboratory animals. It is aimed at the professional level in the veterinary curriculum but is open to graduate-level students. The course is given in a combination lecture/seminar format, with students leading and actively participating in discussions. The student is expected to do assigned and independent outside research, both for class discussions and the paper.

VTMED 696 Fundamental Principles and Techniques of Small-Animal Anesthesia: Dogs, Cats, and Birds
This course is designed for the veterinary student interested in small-animal practice. The course includes lectures, case discussions, and development of anesthetic protocols for routine and complicated cases. Subjects to be covered include anesthetic management for elective and emergency surgery, management of the high-risk patient, fluid therapy, drug interactions, pain management, and the management of anesthesia-related complications, cardiopulmonary resuscitation, and post-anesthetic management. While fundamental concepts and recent advances in anesthesia are discussed, the practical application of anesthetic principles and techniques are a major objective of the course.

VTMED 697 Fundamental Principles of Large-Animal Anesthesia: Equine and Ruminant Practice
This course is designed for the veterinary student interested in equine or mixed-animal practice. The course consists of lectures, case discussions, and development of anesthetic protocols for routine and complicated cases. Subjects to be covered include anesthetic management for elective surgery, field anesthesia, management of the high-risk patient, fluid therapy, drug interactions, pain management, and the management of anesthesia-related complications, cardiopulmonary resuscitation, and post-anesthetic management. While fundamental concepts and recent advances in anesthesia are discussed, the practical application of anesthetic principles and techniques is a major objective of the course.

VTMED 698 Special Projects in Veterinary Medicine
Fall, winter, spring, summer. Variable 1-4 credits. Must be arranged with a College of Veterinary Medicine tenue-track faculty member. S-U grades optional.
This course provides the opportunity for students to work individually with a faculty member to pursue an area of particular interest and, typically, not part of the established curriculum. Specific course objectives and course content are flexible and reflect the scope and academic expertise of the faculty.

VTMED 699 Research Opportunities in Veterinary Medicine
Fall, winter, spring, summer. Variable 1-4 credits. Must be arranged with a College of Veterinary Medicine tenure-track faculty member. S-U grades optional.
This course provides the opportunity for individual students to work in the research environment of faculty involved in veterinary or biomedical research. Course objectives and course content are flexible and reflect the specific research environment. Research projects may be arranged to accumulate credit toward requirements in Distribution Sets I, II, III, IV, and V.

VTMED 700 Theriogenology Service
Spring. 2 or 4 credits. Prerequisite: VTMED 551. Maximum enrollment 5 per rotation. Third- and fourth-year veterinary students. Letter grades only. D. H. Volkmann and staff.
Two-week exposure to clinical procedures in theriogenology as provided by Cornell University Hospital for Animals patient load and augmented by teaching herd animals.

VTMED 701 Cardiology Service
Fall and spring. 2 credits. Prerequisite: VTMED 551. Minimum enrollment 1 per rotation; maximum enrollment 2. Third- and fourth-year veterinary students. Letter grades only. S. Moise.
The purpose of the cardiology rotation is to provide 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 702 Laboratory-Animal Medicine
Fall and spring. 2 credits. Prerequisite: VTMED 551. Maximum enrollment 2 per rotation. 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 offered as a two-week introduction to that specialty. Students accompany laboratory-animal veterinarians on clinical rounds of Cornell's research-animal housing and participate in laboratory diagnostic work. Review sessions are conducted on the biology, medicine, pathology, and husbandry of rodents, rabbits, and primates and on current legislation regulating the care and use of research animals. The course may include field trips to other institutions.

VTMED 703 Clinical Wildlife-, Exotic-, and Zoo-Animal Medicine
Fall, winter, spring, summer. 2 credits. Prerequisite: VTMED 551. Maximum enrollment 3 per rotation (plus one intern or extern). Third- and fourth-year veterinary students. Letter grades only. G. V. Kollias and staff.
This course 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, ongoing veterinary research and service projects, and trips to the Rosamond Gifford Zoo. Successful completion of the course requires satisfactory performance during this 14-day clinical rotation.
VTMED 704  Quality Milk  
Fall or spring. 2 credits. Prerequisite: VTMED 551. Third- and fourth-year veterinary students. Letter grades only. R. Gonzalez, D. Wilson, and staff. This course 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, regional laboratories, zoological facilities, etc. The following are expected to complete a case study on a dairy farm with udder-health problems and present their findings to the producer and farm personnel. Grading is on performance during the course and a final exam.

VTMED 705  Special Opportunities in Clinical Veterinary Medicine  
Fall, spring, and summer. Prerequisite: VTMED 551. Third- and fourth-year veterinary students. S-U grades only. This course 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, regional laboratories, zoological facilities, etc. The following are expected to complete a case study on a dairy farm with udder-health problems and present their findings to the producer and farm personnel. Grading is on performance during the course and a final exam.

VTMED 706  Veterinary Parasitology: Large-Animal  
Fall, winter, spring, and summer. 2 credits. Prerequisites: VTMED 540 and VTMED 541. Minimum enrollment 5. Third- and fourth-year veterinary students. S-U grades only. J. M. Scarlett and staff from the American Society for the Prevention of Cruelty to Animals. This course presents an in-depth look at one or a few parasites of special interest relative to large-animal medicine. 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 parasitism being discussed. Topics vary annually. The course is presented in a lecture/discussion format.

VTMED 707  Veterinary Parasitology: Small-Animal  
Spring. 0.5 credit. Minimum enrollment 2. Third- and fourth-year veterinary students. S-U grades only. D. D. Bowman. This course presents an in-depth look at one or a few parasites of special interest relative to small-animal medicine. The course 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 parasitism being discussed. Topics vary annually. The course is presented in a lecture/discussion format.

VTMED 708  Clinical Oncology  
Fall and spring. 2 credits. Prerequisite: VTMED 551. Maximum enrollment 4 per rotation. Third- and fourth-year veterinary students. Letter grades only. K. M. Basonick. Management and prevention of cancer in companion animals represents a significant component of the practice of veterinary medicine. The focus of this clinical rotation is the development of a comprehensive set of skills necessary for a veterinarian to become an advocate for the client/patient with cancer. These skills include appropriate initial evaluation of animals with cancer; sensitive and effective client and referring-veterinarian communication; ability to access relevant information from numerous sources related to cancer management; and ability to understand and apply principles of surgical, medical, and radiation oncology as well as techniques specifically related to minimize pain and treatment-related effects in cancer patients.

VTMED 709  Clinical Emergency and Critical Care Medicine: Small-Animal  
Fall, winter, spring, and summer. 2 credits. Third- and fourth-year veterinary students. S-U grades only. N. Dhupa.

VTMED 710  Animal Behavior Clinic  
Fall, winter, spring, and summer. 2 credits. Prerequisite: VTMED 681. Maximum enrollment 2 at one time. Third- and fourth-year veterinary students. S-U grades only. K. A. Houpt. The students will participate fully in the Animal Behavior Clinic: answering telephone, mail, and e-mail inquiries, observing and taking charge of behavior cases. To answer inquiries, the student is expected to consult several behavioral textbooks or other sources. Taking charge of the cases includes reading the entire behavioral history, interviewing the owner, forming a diagnosis, conferring with Dr. Houpt or a behavioral resident as to the proper behavioral and pharmacological treatments, and demonstrating behavioral modification techniques and writing a letter to the client. Follow-up calls to earlier cases may be made.

VTMED 711  Herd Health and Biosecurity Risk Evaluation Using the NYS Cattle Health Assurance Program (NYCHELP)  
Summer, fall. 2 credits. Prerequisites: VTMED 540 and VTMED 743. Minimum enrollment 5. Third- and fourth-year veterinary students; others by permission of the instructor. Letter grades only. K. Kaufman, J. L. Welcome, D. V. Nydam, and Diagnostic Lab faculty. This course introduces students to the identification of disease risk and the evaluation of cattle operations, focusing on animal health, food safety, and the environment. It combines information on risk assessment, creation of herd plans, biosecurity, Johne's disease, standard operating procedures, global trade, and environmental issues. Additionally, two local farms are visited to give students the opportunity to implement knowledge gained in lectures.

VTMED 712  Equine Specialty Rotation  
Fall. 2 credits. Prerequisite: VTMED 551. Minimum and maximum enrollment 10. Preference given to fourth-year veterinary students in the equine pathway. Letter grades only. N. G. Ducharme.

The objective of the rotation is to teach basic recognition and clinical skills for students interested in equine practice. These skills prepare students to be sent on related equine calls on their first day of work. The population of horses owned by Cornell is used for these practical skills. The emphasis of this elective is 80 percent hands-on and 20 percent 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 the clinical indications, contraindications, and potential complications of the various modalities.

VTMED 720  Issues and Preventive Medicine in Animal Shelters  
Spring. 1 credit. Prerequisite: VTMED 540. Minimum enrollment 5, maximum enrollment 30. Third- and fourth-year veterinary students. Letter grades only. J. M. Scarlett and staff from the American Society for the Prevention of Cruelty to Animals. Veterinarians often work for or with animal shelters, serve on shelter boards of directors, act as community resources for issues relating to companion animal welfare, participate in spay and neuter programs, and influence the quality of the human-animal bond. This course addresses the history of the humane movement, role of the veterinarian in relation to shelters, preventive and curative health management (including highlighting diseases of major concern), issues surrounding euthanasia, reasons for relinquishment, programs for behavior modification, and the legal concerns of shelters. These issues are addressed using lectures and large-group discussions.

VTMED 721  Timely Topics in Veterinary Parasitology: Large-Animal  
Spring. 0.5 credit. Minimum enrollment 2. Third- and fourth-year veterinary students. S-U grades only. D. D. Bowman. This course presents an in-depth look at one or a few parasites of special interest relative to large-animal medicine. The course 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 parasitism being discussed. Topics vary annually. The course is presented in a lecture/discussion format.

VTMED 722  Timely Topics in Veterinary Parasitology: Small-Animal  
Spring. 0.5 credit. Minimum enrollment 2. Third- and fourth-year veterinary students. S-U grades only. D. D. Bowman. This course presents an in-depth look at one or a few parasites of special interest relative to small-animal medicine. The course 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 parasitism being discussed. Topics vary annually. The course is presented in a lecture/discussion format.
VTMED 723 Bacteria and Fungi in Veterinary Medicine  
Spring. 2 credits. Minimum enrollment 10; maximum enrollment 40. Second-, third-, and fourth-year veterinary students. Letter grades only. D. P. Debbie. This course provides an overview and listing of important bacterial and fungal diseases of domestic animals (cow, horse, sheep, pig, goat, dog, cat in preparation for medicine courses. The etiology, pathogenesis, host response, and prevention are emphasized. Avian, zoonotic, and exotic (foreign animal) bacterial and fungal diseases are covered in less detail. Students are encouraged to cover other courses. The course also provides insight into diagnostic procedures for bacterial and fungal diseases such as available tests, what samples to take, how to handle samples, and how diagnostic procedures are performed.

VTMED 726 Reptile Medicine and Surgery  
Spring. 1 credit. Minimum enrollment 10; maximum enrollment 40. Third- and fourth-year veterinary students. Letter grades only. G. V. Kollias. This course is designed to introduce third- and potentially fourth-year veterinary students to the principles and practice of reptile medicine and surgery. The course is taught in a basic lecture and discussion format.

VTMED 730 Vaccines: Theory and Practice  
Spring. 1 credit. Prerequisite: introductory course in immunology or VTMED 540 or VETMI 315. Minimum enrollment 10; maximum enrollment 40. Second-, third-, and fourth-year veterinary students and graduate students; others by permission of instructor. Letter grades only. Grades based on a final examination and one term report. Offered odd-numbered years. T. Clark. This course provides an overview of vaccines used in clinical practice as well as an in-depth look at vaccine development. Emphasis is placed on the recent advances in vaccine design and delivery, including the use of recombinant DNA techniques for targeting specific immunological responses. Lectures touch on vaccines commonly used on vaccine andadjuvants; attenuated pathogens; recombinant subunit vaccines; viral and bacterial vectors for vaccine delivery; synthetic antibodies; and genetic immunization with “naked” DNA.

VTMED 732 Veterinary Clinical Toxicology  
Spring. 1.5 credits. Second-, third-, and fourth-year veterinary students. S-U grades optional. TBA and K. Earnest-Koons. This course provides veterinary students with a solid introduction to concepts and principles of toxicology and how they are applied in the clinical setting. Students learn about specific toxicologic sites, 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 toxicologic problems. The course is conducted with two 1-hour lectures per week and one hour-long large-group discussion per week. Grades are based on weekly quizzes, a final exam, a short paper, and/or oral presentation.

VTMED 733 Selected Infectious Diseases of Swine  
Spring. 1.5 credits. Minimum enrollment 6; maximum enrollment 40. Second-, third-, and fourth-year veterinary students. S-U grades optional. K. Earnest-Koons. This course 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. The course is conducted with two 1-hour lectures per week and one hour-long large-group discussion per week. The class meets three days per week for one hour each. Grades are based on weekly quizzes, a final exam, a short paper, and/or oral presentation.

VTMED 735 Special Topics in Ambulatory and Production-Animal Medicine  
Fall, winter, spring, and summer. Variable 1–2 credits. Prerequisite: VTMED 500 and approval of a year veterinary student. Second-, third-, and fourth-year veterinary students. Letter grades only. M. E. White and staff. This course provides specialized experiences in the Ambulatory and Production Medicine Service. The course is designed to introduce third- and potentially fourth-year veterinary students to the principles and practice of ambulatory medicine and production medicine. The course is taught in a basic lecture and discussion format.

VTMED 736 Veterinary Diagnostic Imaging  
Spring. 1.5 credits. Prerequisite: VTMED 540, Host, Agent, and Defense. Class of 2005 DVM students only. Letter grades only. P. Scrivani. The course is designed to emphasize the importance of diagnostic imaging in veterinary medicine, particularly in the context of veterinary practice. The course introduces students to the principles of diagnostic imaging, including radiography, ultrasonography, and nuclear medicine. Students learn about the technical aspects of these imaging modalities and their applications in veterinary medicine. The course is taught in a combination of lectures and hands-on laboratory sessions.

VTMED 737 Principles of Pathology  
Spring. 1.5 credits. Minimum enrollment 6; maximum enrollment 40. Second-, third-, and fourth-year veterinary students. Letter grades only. S. McDonough. Principles of Pathology is designed for students who wish to strengthen and broaden their knowledge of the pathologic basis of disease. Fundamental biologic processes as revealed by gross and microscopic changes are emphasized. Molecular mechanisms are integrated into the discussion where appropriate. General pathologic processes are organized into a logical and uniform system to facilitate comprehension and learning with particular attention paid to definition and proper usage of terminology. The course includes two lectures per week and a one-hour large-group discussion. The large-group discussion allows students to apply general knowledge gained in lecture to a specific problem.

VTMED 738 Veterinary Parasitology  
Spring. 2 credits. First-, second-, third-, and fourth-year veterinary students. Letter grades only. D. D. Bowman. This course provides a basic introduction to animal parasites of veterinary importance, concentrating mainly on the biology, control, and diagnosis of protozoan and helminth parasites. Emphasis is given to parasites representative of significant disease processes or of significant clinical importance to veterinarians. The course elaborates on the biology and pathogenesis of the major parasites with the ultimate goal of maximizing the recognition of the major disease manifestations induced by the different groups of organisms. Laboratories stress certain aspects of some important parasite groups.

VTMED 739 Viruses in Veterinary Medicine  
Spring. 1.5 credits. Minimum enrollment 90. Second-, third-, and fourth-year veterinary students. Letter grades only. C. R. Parrish and J. Baines. This course is designed to supplement the information provided in the foundation courses, particularly Foundation Courses IV and V. The objective is to provide, in a survey form, an overview of the major families of viruses that infect animals and to give a summary of the diseases that they cause. The diseases that are most commonly encountered in veterinary practice are given the greatest amount of the available time, and diseases that are less frequently seen are given less detailed coverage. The properties of the viruses, their general pathogenic mechanisms, diagnostic methods, and some specific examples are covered.

VTMED 740 Veterinary Perspectives on Pathogen Control in Animal Manure  
Spring. 2 credits. Third- and fourth-year veterinary students. Letter grades only. D. D. Bowman. This course presents an in-depth look at the management of pathogens in animal manures. It reviews the pathogens involved, the role of governing agencies, the survival of pathogens in the field, and methods of pathogen destruction. The course discusses commercial methods of manure processing for the control of these pathogens for the protection of other animals and the human population. The course concludes with class discussions with major stakeholders representing the dairy, beef, pork, and poultry industries and their understanding of the problem as it relates to veterinary students.

VTMED 741 Microbial Safety of Animal-Based Foods  
Spring. 1 credit. Minimum enrollment 10; maximum enrollment 20. Second-, third-, and fourth-year veterinary students. Letter grades only. B. L. Njaa and M. Wiedmann. This class will meet for two hours once a week for eight weeks. In the first two weeks, the instructor will provide an overview of...
VTMED 742 Dairy Business Management and Health Economics


This course will help veterinary students understand basic principles of dairy economics and business management and develop specific skills used by veterinarians in health economic decision making. Three main topic areas will be covered. The first will be an overview of dairy economics from regional, national, and global perspectives. The second part of the course will present the terminology and concepts used in dairy business financial analyses and economic decision making. The last section will focus on dairy health economics, including the application of economic tools to decisions related to disease treatment, health maintenance, and productivity.

VTMED 743 Interaction with the Animal Health Diagnostic Laboratory for Investigating Herd Problems

Spring. 1 credit. Minimum enrollment 5. Third- and fourth-year veterinary students, others by permission of the instructor. Letter grades only. D. V. Nydam and others.

This seminar course uses an interactive format and multiple experts from their fields to introduce future veterinarians how best to use the services of a diagnostic laboratory when investigating herd problems. The course will combine logistical and factual matters such as appropriate sample submission, tests available for various pathogens, and relative test interpretation with practical case-based discussion of the various diagnostic modalities. Topics will include virology (e.g., BVD), bacteriology (e.g., Salmonella), parasitology (e.g., Cryptosporidium), molecular techniques (e.g., E. coli), herd-level test interpretation, and outbreak investigation.

VTMED 744 Veterinarians and Food-Animal Production Systems: An Introduction

Spring. 1 credit. Minimum enrollment 5. First- and second-year veterinary students, others by permission. 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 how best to use the services of a diagnostic laboratory when investigating herd problems. The course will combine logistical and factual matters such as appropriate sample submission, tests available for various pathogens, and relative test interpretation with practical case-based discussion of the various diagnostic modalities. Topics will include virology (e.g., BVD), bacteriology (e.g., Salmonella), parasitology (e.g., Cryptosporidium), molecular techniques (e.g., E. coli), herd-level test interpretation, and outbreak investigation.

VTMED 745 Dynamics of Dairy Herd Health and Management


Competitive producers increasing input costs, and progressively stagnating milk and salvage values require dairy producers to become more efficient. The current trend of increasing herd size also drives changes in management. Veterinarians are called upon to advise dairy producers not only in matters of herd health but increasingly in matters of productivity and management decision making. Identifying opportunities to improve productivity and ultimately profitability requires veterinarians to recognize and solve complex and interdependent milk production, reproduction, and health issues. The goal of this course is to teach students the dynamic relationships of herd health and management. This is done with a combination of lectures and computer exercises. The following topics are addressed: 1) how often production diseases occur and when, 2) how they are interrelated, 3) the impact of disease on milk production, reproductive performance, and risk of culling, and 4) how to use this information in production medicine. The format of this eight-week course consists of two one-day lectures and hands-on work with computer software for data management and analysis.

VTMED 746 Fish Health Management

Spring. 1.5 credits. Minimum enrollment 8; maximum enrollment 16. First-, second-, third-, and fourth-year veterinary students; others by written permission of instructor. Letter grades only. P. J. Farnsworth.

A lecture and laboratory course providing an overview of the aquatic environment and the important infectious and noninfectious diseases of fish. Diseases covered will be presented in the context of their occurrence in a commercial aquaculture, aquatic systems, and natural waters. The laboratory is designed to provide students with a knowledge base and hands-on diagnostic experience in the diseases of fish. Students also will learn about and manage aquatic systems during the course to gain an appreciation for the science behind the operation of these systems. The laboratory will require time outside the normal scheduled class sessions (to be scheduled by the students) for management of the aquatic systems. Each student also will make a presentation on a topic in aquatic animal health during the course.

VTMED 747 Exotic Small Mammals as Pets

Spring. 1.5 credits. Students enrolled in VTMED 703 are encouraged to enroll. Maximum enrollment 80. Third- and fourth-year veterinary students. Letter grades only. J. K. Morrisey.

This course centers on the husbandry, clinical presentation, diagnosis, and treatment of common diseases of small mammals that are pets. These species include ferrets, rabbits, guinea pigs, chinchillas, rats, mice, hamsters, gerbils, hedgehogs, sugar gliders, and other animals. Grading is by letter and based on a midterm and final examination.

VTMED 748 Canine and Feline Medical Genetics

Spring. 2 credits. Prerequisites: VTMED 520, 530, and 531. Minimum enrollment 10; maximum enrollment 40. S-U grades optional. V. N. Meyers-Wallen.

This course covers the genetic and pathophysiological 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 749 Anaerobic Infections of Animals

Spring. 1 credit. Prerequisite: VTMED 740. Minimum enrollment 10, maximum enrollment 20. S-U grades only. P. L. McDonough and staff.

This course presents anaerobic infections in clinical context as an adjunct to the material covered in Block IV. Students gain an understanding of the diversity and biology of anaerobic bacteria and the niches that they occupy in the animal and avian body. A basic, clinically oriented taxonomy is presented, and students learn about the virulence and pathogenesis of the major anaerobes that will be encountered in clinical practice. The clinical signs of anaerobic infections, laboratory identification and susceptibility testing, and the use of specimen transport media are also covered. Treatment of common infections, including wound care, is covered and vaccines currently available are discussed in detail. In the second four weeks of the course, students learn about the major clinical syndromes caused by anaerobes (e.g., myositis, tetanus, botulism, periodontal disease, foot rot, and urinary neoplasms). The format consists of two one-hour lectures per week for eight weeks (one lecture period is spent in the laboratory looking at demonstrations for the identification of anaerobes and clinical gram stains).

VTMED 750 Managing Infectious Diseases in Small Animal Populations

Spring. 1 credit. Prerequisite: VTMED 720 strongly recommended. Minimum enrollment 3; maximum 20. Third- and fourth-year veterinary students. Letter grade only. J. M. Scarlett.

This course is intended as a sequel to the Issues and Preventive Medicine in Animal Shelters course offered in the C Distribution block. In light of the time constraints in the Issues course, the principles of prevention and control to specific diseases (e.g., ringworm, kennel cough) commonly encountered in small animal populations are not discussed. This course encourages students to apply principles of infectious disease, epidemiology, and preventive medicine to infectious disease problems in small animal populations, with a particular emphasis on disease problems in shelters. Mention of modification to fit other small animal populations (e.g., catteries, kennels) will be made.
Biomedical Sciences

VTBMS 346 Introductory Animal Physiology (also BIOAP 311) (Undergraduate)
Fall. 3 credits. Prerequisites: BIOC 105, BIOC 106, or BIOG 101, BIOG 102, BIOG 103, BIOG 104, BIOG 107, BIOG 108; CHEM 207, CHEM 208, or CHEM 209, or CHEM 215, CHEM 216; MATH 106, MATH 111 or MATH 191 or AP credit for any of the above; or one year of college-level biology, chemistry, and mathematics. S-U grades only. E. R. Lawo.
A 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.

VTBMS 600 Special Projects in Anatomy
Fall, spring. 1 credit per 2-1/2-hour period. By permission of instructor. S-U grades only. Biomedical science staff.

VTBMS 628 Graduate Research in Animal Physiology (also BIOAP 719; Graduate)
Fall, spring. 1-3 credits. By written permission of department chairperson and faculty member who will supervise the work and assign the grade. S-U grades optional.

VTBMS 700 Predictions of Form or Phylogeny
Fall. 1 credit. By permission of instructor. S-U grades optional. J. W. Herrmann.
Form and function are often discussed as a correlated entity in biology. This seminar group starts with the question: Does form really predict function? This is addressed initially with respect to the analysis of paleobiology but then encompasses examples of experimental functional morphology. In particular, there is a growing body of experimental data demonstrating that diverse functions can be achieved with nearly identical morphologies and that the functional diversity may better be explained by behavior or environmental factors. Might these observations refute current theories about the origin of flight in extinct organisms (i.e., the cursorial or ground-up theory of flight versus the arboreal gliding theory of flight evolution)? Specific examples of the analysis of the cell cycle; a summary of cell cycle regulatory processes; and practical methods for cell cycle analysis, including mathematical representations. Topics include growth control of bacterial cell cycle, inducibility of mammalian cell tissue culture, cell synchronization, flow cytometry, age-density representation, G1 regulation, labile regulatory protein models, cell transformation, regulation by growth factors and the cytoskeleton, cyclin/EIF/RB regulatory model, practical examples for analysis of cell cycle phase durations, cell cycle phase specific growth factor sensitivity, timing of RB protein phosphorylation within the cell cycle. The final portion of the course will present graduate students with methods for cell cycle analyses that will be used in their research.

VTBMS 720 Special Problems in Physiology (Graduate)
Fall, spring. 1 credit. By permission of instructor. S-U grades only.

VTBMS 780 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. B. A. Summers and staff.
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 description of the lesions. In addition, appropriate guest lecturers cover specific areas of interest and special topics not encountered in the departmental service programs.

Clinical Sciences

VTETCS 299 Research Opportunities in Clinical Sciences
Summer. 6 credits. Prerequisites: one year of basic biology (scores of 5 on Biology Advanced Placement Examination of the College Entrance Examination Board or BIOG 101 or BIOG 102 or BIOG 103 or BIOG 104 or BIOG 107 or BIOG 108; CHEM 207, CHEM 208, or CHEM 209, or CHEM 215, CHEM 216; MATH 106, MATH 111 or MATH 191 or AP credit for any of the above; or one year of college-level biology, chemistry, and mathematics). S-U grades only.

VTETCS 700 Pathophysiology of Gastrointestinal Surgery
Fall. 1.5 credits. Prerequisites include D.V.M., M.D., or equivalents or approval of instructor. S-U grades only. Offered every third year. E. J. Trotter.

VTETCS 701 Pathophysiology of Cardiovascular Surgery (Graduate)
Fall. 1.5 credits. Prerequisites: D.V.M. degree or equivalent. S-U grades only. Offered every third year. Next offered 2005. R. P. Hackett, S. L. Fubini, and N. G. Ducharme.

VTETCS 702 Pathophysiology of Cardiopulmonary Surgery (Graduate)
Fall. 1.5 credits. Prerequisites: D.V.M. degree or equivalent. S-U grades only. Offered every third year. Next offered 2006. S. Fubini and V. Cook.

VTETCS 703 Surgical Principles and Surgery of the Integumentary System (Graduate)
Spring. 1.5 credits. Prerequisite: D.V.M. or equivalent in residency or graduate training programs. S-U grades only. Offered every third year. Next offered 2006. S. Fubini and V. Cook.

VTETCS 704 Pathophysiology of Urogenital Surgery (Graduate)
Fall. For graduate D.V.M. or equivalent in residency or graduate training programs. 1.5 credits. S-U grades only. Offered every third year. Next offered 2006. S. Fubini and V. Cook.

This course is designed to review and discuss urogenital surgical procedures in animals and the rational basis for them. Pathophysiology will be stressed. Summer courses will consist of reprints with discussion.
VETCS 705 Animal Pain and its Control
Spring. 2 credits. By permission of instructor. S-U grades optional. Offered odd-numbered years. R. D. Gleed, J. W. Ludders, P. F. Moon, and L. P. Posner. This course covers the basic principles of animal pain and its control. Topics include methods of detecting pain in animals, the influence of pain on behavior and physiology, and the pharmacologic mechanisms underlying analgesic therapy. The subject matter is presented through lectures, group discussions, group readings, and group evaluation of analgesic protocols.

VETCS 706 Pathophysiology of Neurologic Surgery (Graduate)
Spring. 1.5 credits. Prerequisite: D.V.M., M.D., or equivalent or approval of instructor only. Offered every third year. Next offered 2006. A. J. Nixon and E. J. Trotter. This course provides specialized training in neurosurgical techniques and application and discusses pathophysiologic implications of neurosurgical and neurologic diseases.

VETCS 710 Advanced Veterinary Anesthesiology I
Fall. 1 credit. Prerequisite: VTMED 568, Veterinary Anesthesiology, or permission of instructor. Third- and fourth-year veterinary students. One session only. R. D. Gleed and J. W. Ludders. The content of this course is designed for preparation for the American College of Veterinary Anesthesiology examinations. However, the course is also suitable for interns and for residency training in other areas such as surgery and internal medicine. Participants are from both inside and outside the college. Topics cover the basic sciences as they apply to anesthesia, such as physics and engineering, and applied pharmacology, physiology, and pathology. Clinically oriented lectures are also given concerning specific anesthetic techniques and species-specific differences in response to anesthetic drugs.

VETCS 711 Advanced Veterinary Anesthesiology II
Spring. 1 credit. Prerequisite: VTMED 568, Veterinary Anesthesiology or permission of instructor. Third- and fourth-year veterinary students, graduate students, interns, and residents. R. D. Gleed and J. W. Ludders. The content of the course is designed for preparation for the American College of Veterinary Anesthesiology examinations. However, the course is also suitable for interns and for residency training in other areas such as surgery and internal medicine. Speakers are from both inside and outside the college. Topics cover the basic sciences as they apply to anesthesia, such as physics and engineering, and applied pharmacology, physiology, and pathology. Clinically oriented lectures are also given concerning specific anesthetic techniques and species-specific differences in response to anesthetic drugs.

Microbiology and Immunology

VETMI 299 Research Opportunities in Microbiology and Immunology
Summer. 6 credits. Prerequisites: one year of basic biology (scores of 5 on Biology Advanced Placement Examination of the College Entrance Examination Board or BIO G 100 with a grade of C- or equivalent grade only. A minimum of 120 hours of laboratory time is expected per three course credits. Microbiology and Immunology faculty. This is a mentored research apprenticeship program designed to give laboratory experience to undermatriculated high school students (participating in Cornell Summer College). Students will be placed in research laboratory with designated project under the direct supervision of a research associate (upper-level graduate student, post-doc, or faculty member). Students will be graded on preparation, participation in laboratory academic life, and appropriate acquisition of techniques. At the end of the six-week session, they will be expected to give brief (15- to 20-minute) oral presentations on their work and submit manuscripts in a form suitable for publication. The faculty director of the laboratory will have ultimate responsibility for evaluating the student's work and assigning the grade.

VETMI 315 Basic Immunology
(also Biological Science 305; Undergraduate)
Fall. 3 credits. Strongly recommended: basic courses in microbiology, genetics, and biochemistry. S-U grades optional. J. A. Marsh. This course is a survey of immunology, with emphasis on the cellular and molecular bases of the immune response. More information is available at the BIOG 305 courseinfo web site.

VETMI 331 General Parasitology
(also BIOMI 331; Undergraduate)
Spring. 2 credits. Prerequisites: zoology or biology; any of the following courses: BIOES 261, 264, 267, 274, 275, 278; BIOG 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 120, 202, 207; BIOMI 192, 290, 398, or equivalent course. Letter grades only. D. D. Bowman. This course is a survey of the major animal parasites, protozoan, nematode, platyhelminth, acanthocephalan, annelid, and arthropod. A companion seminar addresses the current and classic literature related to microbial pathophysiology on the cellular and molecular levels.

VETMI 409 Principles of Virology
Fall. 3 credits. Prerequisites: BIOMI 290 and 291 or permission of the instructor. Recommended: BIOMI 408, BIOMI 330-332, BIOMI 432. G. Whitaker and H. Lazarovitz. The course covers the principles of virology, focusing mainly on animal viruses but also including plant viruses and bacteriophage. Topics include the classification of viruses, virus entry, genome replication and assembly, and virus pathogenesis. Particular emphasis is placed on virus-host cell interactions and common features between different viral families.

VETMI 431 Medical Parasitology
(also BIOMI 417; Undergraduate)
Fall. 2 credits. Prerequisites: zoology or biology; any of the following courses: BIOES 261, 264, 267, 274, 275, 278; BIOG 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 170, 202, 207; BIOMI 192, 290, 398, or equivalent course. Letter grades only. D. D. Bowman. This course is a systematic study of arthropod, protozoan, and helminth parasites of public health importance, with emphasis on epidemiologic, clinical, and zoologic aspects of these parasitism.

VETMI 605 Special Projects in Microbiology (Undergraduate)
Fall, spring. 1–3 credits. By permission of instructor. S-U grades only. Faculty TBA. This course is offered by individual faculty members in the Department of Microbiology and Immunology for DVM students undertaking research in Research Fellowship. This course cannot be used to fulfill the formal course requirements for the DVM curriculum.

VETMI 700 The Biology of Animal and Plant Viruses
(Graduate and Undergraduate)
Fall. 2 credits. Letter grades only. Offered odd-numbered years. C. R. Parrish and virology faculty. This course examines current topics in studies of animal viruses, including some comparisons with plant viruses where similar mechanisms apply. Selected topics are examined in depth, including the structures of viruses and their components, viral nucleic acids and replication strategies, details of the interactions between viruses and their host cell components and metabolism. Other topics include the evolution and selection of viruses, novel approaches to the prevention of virus infection, and methods for antiviral chemotherapy.
[VETMI 705 Advanced Immunology (also Biological Sciences 705; Graduate)]
Spring. 3 credits. Prerequisite: VETMI 315 Basic Immunology or permission of instructor. Letter grades only. Offered every even-numbered years. J. Marsh and staff. Coverage at an advanced level of molecular and cellular immunology.

[VETMI 707 Advanced Work in Bacteriology, Virology, and Immunology (Graduate)]
Fall, spring. 1–3 credits. By permission of instructor. S-U grades optional. Microbiology staff.
This course is designed primarily for graduate students with a good background in pathogenic microbiology and immunology. It may be elected by veterinary students who are properly prepared.

[VETMI 712 Seminars in Infection and Immunity]
Fall, spring. 1 credit. Required of all graduate students in the department of Microbiology and Immunology and the field of Immunology. S-U grades only. D. Russell.
Invited speakers in immunology and infection biology acquaint students with current advances in the field.

[VETMI 719 Immunology of Infectious Diseases (also Biological Sciences 706; Graduate)]
Spring. 2 credits. Prerequisite: VETMI 315 Basic Immunology or permission of instructor. S-U grades optional. Offered odd-numbered years. E. Y. Denkers and staff.
This graduate-level course focuses on molecular and cellular mechanisms underlying the immunity to infectious diseases caused by viral, bacterial, protozoan, and helminth pathogens. Topics include immune response initiation; antigen presentation pathways; Th1 and Th2 cytokines in protection and pathogenesis; mechanisms of cytolysis; immune evasion strategies; vaccines. Lectures are based upon recent advances in the field and are accompanied by relevant readings from the current literature.

[VETMI 723 Current Topics in Immunology]
Fall, spring. 1 credit. S-U grades only. Immunology faculty.
An immunology discussion group in which students present research papers from the contemporary scientific literature. Course is limited to graduate students. Registration each term is required of Field of Immunology graduate students.

[VETMI 737 Advanced Work in Animal Parasitology (Graduate)]
Fall, spring. 1–3 credits. For advanced undergraduate, graduate, and veterinary students. Letter grades only.
D. D. Bowman and other faculty.
This course is intended for advanced undergraduate, graduate and veterinary students with interests in parasitology research.

[VETMI 770 Advanced Work in Avian Diseases (Graduate)]
Fall, spring. 1–3 credits. By arrangement with instructor. Letter grades only. K. A. Schat.

[VETMI 772 Advanced Work in Aquatic Animal Diseases (Graduate)]
Fall, spring. 1–3 credits. By arrangement with instructor. S-U grades only. P. R. Bowser.

[VETMI 773 Advanced Work in Avian Immunology]
Fall, spring. Variable credit. Letter grades only. K. A. Schat.

[VETMI 783 Seminars in Parasitology (Graduate)]
Fall, spring. 1 credit. Open to veterinary students or graduate students; others by permission of instructor. S-U grades only. D. D. Bowman.
This is a seminar series designed to acquaint students with current research in the field of parasitology. The range of topics is determined, in part, by the interests of those participating and may include such topics as the ecology of parasitism, parasite systematics, wildlife parasitology, and parasitic diseases of plants and animals, including humans.

Molecular Medicine

[VETMM 299 Undergraduate Research in Pharmacology]
Summer. 3 to 6 credits (3 credits per 120 contact hours). Prerequisites: one year of basic biology (Score of 5 on Biology Advanced Placement Examination of the College Entrance Examination Board or HIOG 100 level.) Letter grades only. R. A. Cerione.
This is a mentored research apprenticeship program designed to give laboratory experience to high school students (participating in Cornell Summer College) or Cornell underclassmen. Students are placed in a research laboratory with a designated project under the direct supervision of a research associate (upper-level graduate student, post-doc, or faculty member). A minimum of 120 hours of laboratory time is expected per three course credits. Students are graded on preparation, participation in laboratory academic life, and appropriate acquisition of techniques. At the end of the six-week session, students are expected to give brief (15- to 20-minute) oral presentations of their work and submit a manuscript in a form suitable for publication. The faculty director of the laboratory has ultimate responsibility for evaluating the student's work and assigning the grade.

[VETMM 470 Biophysical Methods (also A&EP 470 and BIONB 470)]
Spring. 3 credits. Prerequisites: permission of instructor. Letter grades only. W. Zipfel.
This course is an overview of the diversity of modern biophysical experimental techniques used in the study of biological systems at the cellular and molecular level. Topics covered include methods that examine both structure and function of biological systems. Fourier optics and image processing, confocal and multiphoton microscopy, phase contrast, electron microscopy, X-ray diffraction and protein structure determination, multidimensional NMR spectroscopy, calcium measurements, resonance energy transfer, membrane biophysics, electrophysiology, ion channels, action potentials, ligand-gated channels, fluctuation analysis, patch-clamp, molecular biology, ion channels, rapid kinetics, caged compounds, transmitter release, capacitance measurements, amperometry, optical traps, and molecular force measurements. The course is intended for students of the engineering, physics, chemistry, and biological disciplines who seek an introduction to modern physical experimental methods. Due to the interdisciplinary nature of the course, students have diverse backgrounds. Therefore, a basic knowledge of and interest in physics and mathematics is expected, but strong attempts are made to give an intuitive understanding of the mathematics and physics involved. Some knowledge of physical chemistry, molecular and cell biology, or neurobiology is helpful. Depending on individual backgrounds, all students find certain aspects of the course easy and other aspects demanding.

[VETMM 610 Cellular and Molecular Pharmacology]
Fall. 2 credits. By permission of the instructors. S-U grades optional. Offered every even-numbered years. G. W. G. Sharp and field of pharmacology faculty.
This graduate-level course surveys the molecular and cellular aspects of receptor mechanisms, signaling pathways, and effector systems. Topics include drug-receptor interactions; ligand- and voltage-gated ion channels; G protein pathways; growth factor signaling; lipid signaling; calcium; nutrient and nitric oxide signaling; and mechanisms of receptor-mediated effects on neural excitability, electrical pacemakers, muscle contraction, and gene expression.

[VETMM 611 Systems Pharmacology]
Spring. 2 credits. By permission of the instructors. S-U grades optional. Offered every even-numbered years. C. M. S. Frewell and field of pharmacology faculty.
This graduate-level course surveys system- and organ-related aspects of pharmacology. Topics include drug disposition; pharmacokinetics; autonomic pharmacology; central nervous system pharmacology; pharmacology of inflammation, allergy, and platelet function; cardiovascular, gastrointestinal and endocrine pharmacology; and chemotherapy, including antimicrobial agents and cancer chemotherapy.

[VETMM 700 Calcium as a Second Messenger in Cell Activation]
Spring. 2 credits. By permission of instructor. Lecture-discussion. S-U grades only. Offered every even-numbered years. C. M. S. Frewell.
This course focuses on regulation of intracellular calcium concentrations for studying calcium movements and distribution in cells. Topics include calcium channels and exchangers, calcium-binding proteins, and calcium stores; phosphatidylinositol turnover, release of calcium from stores, and activation of calcium influx; calcium gradients and oscillations; mechanisms of exocytosis and the proteins involved. Each topic is introduced with a lecture followed by discussion of recent papers from the literature.

[VETMM 701 Organ-System Toxicology (also TOX 611)]
Fall. 1 credit. For graduate students in environmental toxicology. S-U grades only. Offered every even-numbered years. W. S. Schwartz.
This is a minicourse on molecular mechanisms involved in chemical toxicity. Specific examples of toxicity in organ systems
such as the nervous system, kidney, liver, respiratory tract, and cardiovascular system are considered.

[VETMM 703 Receptor-Ligand Interactions (also BIONB 790-02)]
Fall. 2 credits. By permission of the instructors. S-U grades optional. Offered odd-numbered years. G. A. Weiland and R. E. Oswald.

The course covers both the practical and theoretical tools for the study of ligand-receptor interactions, emphasizing the quantitative and physical chemical aspects of receptor structure. The course also includes basic methods of radioligand binding assays, including separation and measurement of bound and free ligand; characterization of receptor function, analysis of receptor structure, thermodynamic basis of the binding; methods of analyzing equilibrium binding; equilibrium binding for complex binding mechanisms; and kinetics of simple and complex binding mechanisms.

[VETMM 704 CNS Synaptic Transmission]
Fall. 2 credits. Maximum enrollment 20 graduate students and undergraduate seniors with permission of instructor. S-U grades optional. Offered odd-numbered years. L. M. Nowak.

This is a survey course in vertebrate central nervous system physiology and pharmacology, that focuses on mechanisms of neurotransmitter action at the membrane and cellular levels. Roles of selected neurotransmitters in normal brain and neurological disorders are covered. Topics are introduced in lectures and followed up by discussions of recent journal articles.

[VETMM 705 Chemistry of Signal Transduction]
Fall. 2 credits. Offered odd-numbered years. R. A. Cerione.

This course focuses on the mechanisms of action of GTP binding proteins. Several receptor-coupled signaling systems are examined, including adenylyl cyclase, vertebrate vision, phosphatidylinositol lipid turnover, receptor systems regulating various ion channels, and receptors involved in cell growth regulation.

[VETMM 706 Growth Factor-Coupled Signaling (also BIOBM 734)]
Fall. 0.5 credit. Offered odd-numbered years. R. A. Cerione.

The general theme of this course is mitogenic signaling pathways. Receptor tyrosine kinases, src, ras, and ras-regulatory proteins are covered.

[VETMM 707 Protein NMR Spectroscopy (also BIOBM 730)]
Spring. 2 credits. Prerequisites: CHEM 369 and 390 or CHEM 287 and 288 or permission. S-U grades optional. Offered odd-numbered years. R. E. Oswald and L. K. Nicholson.

The student acquires the tools necessary for in-depth understanding of multidimensional nuclear magnetic resonance (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 709 Topics in Cancer Cell Biology]
Fall and spring. 0.5-1 credit per section. Letter grades only. Course offered in odd-numbered years. Students may select modules (sections) of interest to them. B. U. Pauli.

[Section 1—Cell Adhesion Molecules, Signaling, and Cancer]
Fall. J. Guan.

This one-credit module introduces the role of cell adhesion receptors in cancer. Emphasis is on the integrin and cadherin families of cell adhesion molecules and their roles in signal transduction and cancer. Topics include the structure and function of integrins, integrin interactions with cytoskeleton, intracellular signaling pathways in cell-matrix interactions, integrin-mediated signaling in cell migration, proliferation and survival, changes of integrins in tumors and metastasis, structure and function of cadherins, signaling mechanisms in cell-cell interactions in normal development and cancer.

[Section 2—Cell-Cycle Analysis (also TOX 713 and TOX 698)]
Fall. A. You.

This one-credit module presents a brief historical review of the cell cycle; a summary of cell-cycle regulatory processes; and practical methods for cell-cycle analysis, including pharmacological representations. Topics include control growth of bacterial cell cycle including chemostats, mammalian cell tissue culture, cell synchronization, flow cytometry, age- density representation, G1 regulation, lable regulation, 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, 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 useful in their research.

Section 3—Principles of Metastasis
Spring. B. U. Pauli.

This one-credit module discusses the following principles: the molecular basis of cancer progression leading to metastasis (clonal evolution of metastatically competent cancer cells; contribution of specific oncogenes and tumor suppressor genes); the routes of metastasis spread: the process of invasavasation emphasizing the roles of matrix-degrading proteases (e.g., tissue metalloproteinases, plasmin, heparanase, etc.) and angiogenesis; host effect on circulating cancer cells: immunological and hemodynamic considerations: organ- preference of metastasis: the roles of tumor cell/endothelial cell adhesion receptor ligand pairs (e.g., polymorphic fibronectin/DPP IV, b3 integrin/CLCA; CD44/hyaluron; cytokine-inducible CAMs); chemokines and chemokine receptors; extracellular matrix components; etc.; emergence of micrometastases: the roles of adhesion-signaling and kinase-mediated signaling in intravascular growth promotion of arrested cancer cells; and, animal model of metastasis and anti-metastasis treatment strategies.

Section 4—Angiogenesis in Normal Development, Cancer, and Other Diseases
Fall. B. U. Pauli.

Topics discussed in this one-credit module include vasculogenesis versus angiogenesis, tumor angiogenesis: the angiogenic switch; molecular and cellular principles of tumor vessel formation; structure and function of tumor vessels (e.g., chaotic architecture and high vascular permeability; altered endothelial surface markers; parakrine- and perfusion-driven tumor growth stimulus, role of hematopoietic stem cells in promoting tumor angiogenesis; angiogenesis in normal epithelial disease; hypoxia-driven pathological angiogenesis and vascular remodeling; inflammation-induced angiogenesis and vascular remodeling (special emphasis: wound healing); and therapeutic perspectives: promises and problems.

Section 5—Current Topics in Oncogenic Viruses
Fall. J. Casey.

Section 6—Growth Factor-Coupled Signaling (also VETMM 706)
Fall. R. Cerione.

The general theme of this 0.5-credit module is mitogenic signaling pathways. Receptor tyrosine kinases, src, ras, and ras-regulatory proteins are covered.

[VETMM 720 Patch-Clamp Techniques in Biology]
Spring. 2 credits. By arrangement with the instructor. S-U grades only. Offered even-numbered years. B. U. Pauli.

This course 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-Secretion Coupling—C. M. Seftwrell; Mechanisms of Neurotransmitter Release—M. Lindau; Central Nervous System Neurotransmitters—L. M. Nowak; Structure-Function of the Nicotinic Acetylcholine Receptor—R. E. Oswald.
VTPMD 700 Special Projects in Diagnostic Endocrinology
Fall, spring, 1-3 credits. Prerequisite: VTPMD/VETCS 665 and VTPMD 664. S-U grades only. J. M. Scarlett.

An independent study course. Students have the opportunity to research a particular topic in diagnostic/clinical endocrinology of animals.

VTPMD 707 Clinical Biostatistics (Graduate)
Spring. 2 credits. Minimum enrollment 2; maximum enrollment 15. For veterinary residents or graduate students. Letter grades only. S-U grades only. Epidemiology faculty.

This course explains the theory behind and the 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 708 Epidemiology Seminar Series (Graduate)
Fall, spring. 1 credit. S-U grades only. Epidemiology faculty.

Advanced theoretical and analytical epidemiologic concepts and techniques are discussed.

VTPMD 766 Graduate Research (Graduate)
Fall, spring, summer. Credit and hours TBA. Must be registered in master’s or Ph.D. program and obtain permission of the graduate faculty member concerned. S-U grades only. Epidemiology faculty.

This course enables students outside the section of epidemiology to receive graduate research credits for projects with epidemiological components.

The course objectives are 1) to know the difference between different epidemiologic study designs and relative advantages and disadvantages of each; 2) given a problem (usually a field situation), be able to design an appropriate epidemiologic study; 3) be able to effectively analyze and criticize published epidemiologic studies.

The course 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 studies include observational cohort studies (prospective and retrospective), cross-sectional studies, case-control studies, and hybrid studies (ambidirectional and other hybrid designs).

VTPMD 766 Advanced Methods in Epidemiology (Graduate)
Fall. 5 credits. Prerequisites: VTPMD/VETCS 664 and VTPMD 665 (College of Agriculture and Life Sciences). S-U grades optional. J. M. Grohn.

Concepts introduced in VTPMD 664 and VTPMD 665 are further developed, with emphasis on statistical methods. Topics include interaction, effect modification, stratified analysis, matching and multivariable (logistic regression) methods, survival analysis, and strategies for the analysis of epidemiologic data.

VTPMD 769 Doctoral-Level Thesis Research
Fall, spring, and summer. Credits and hours TBA. Must be registered in master’s or Ph.D. program in epidemiology. S-U grades only. Epidemiology faculty.

This course enables students in the section of epidemiology to receive graduate research credits for their doctoral research.

VTPMD 799 Independent Studies in Epidemiology
Fall, winter, and spring. Limited to graduate students. Letter grades only. Epidemiology faculty.

The purpose of the course is to investigate an epidemiologic topic with one of the instructors. It provides experience in problem definition, research design, and the analysis of epidemiologic data.

FACULTY ROSTER

Abou-Madi, Noha, D.V.M., U. of Montreal (Canada). Lecturer, Clinical Sciences
Aguirre, Gustavo D., Ph.D., U. of Pennsylvania. Alfred H. Caspary Professor, Clinical Sciences
Ainsworth, Dorothy M., Ph.D., U. of Wisconsin-Madison. Prof., Clinical Sciences
Alcaraz, Ana, D.V.M., U. of Autonoma Natl De Mexico. Lecturer, Biomedical Sciences
Antczak, Douglas F., Ph.D., U. of Cambridge (England). Dorothy Havemeyer McConville Professor of Equine Medicine, Microbiology, and Immunology
Appel, Max J., Ph.D., Cornell U. Prof. Emeritus, Microbiology and Immunology
Appleton, Judith A., Ph.D., U. of Georgia. Prof., Microbiology and Immunology
Baines, Joel, Ph.D., Cornell U. Assoc. Prof. Microbiology and Immunology
Balkman, Cheryl, D.V.M., Cornell U. Lecturer, Clinical Sciences
Barr, Stephen C., Ph.D., Louisiana State U. Prof., Clinical Sciences
Bell, Robin G., Ph.D., John Curtin School (Australia). Prof., Microbiology and Immunology
Benyamini, Chava, Ph.D., Washington State U. Prof., Biomedical Sciences
Beyenbach, Klaus, Ph.D., Texas A&M. Prof., Biomedical Sciences
Bloom, Eric J., D.V.M., U. of Pretoria. Senior Lecturer, Biomedical Sciences
Bower, Max J., Ph.D., Penn State U. Prof., Microbiology and Immunology
Brower, Paul R., Ph.D., Auburn U. Prof., Microbiology and Immunology
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
Cerione, Richard A., Ph.D., Rutgers U. Prof., Molecular Medicine
Chang, Yung Fu, Ph.D., Wisconsin-Madison. Dorothy Havemeyer McConville Professor of Equine Medicine, Microbiology, and Immunology
Cook, Vanessa L., Veterinary MB, Cambridge U. (U.K.) Lecturer, Clinical Sciences
Riis, Ronald C., D.V.M., U. of Minnesota. Assoc. Prof., Clinical Sciences

Roberson, Mark S., Ph.D., U. of Nebraska at Lincoln. Assoc. Prof., Biomedical Sciences

Russell, David G., Ph.D., Imperial College, London U. (England). Prof., Microbiology and Immunology

Sacco, Tyson, Ph.D., U. of California. Lecturer, Biomedical Sciences


Scarlett, Janet M., Ph.D., U. of Minnesota. Assoc. Prof., Population Medicine and Diagnostic Sciences

Schat, Karel A., Ph.D., Cornell U. Prof., Microbiology and Immunology

Schlafer, Donald H., Ph.D., U. of Georgia. Prof., Biomedical Sciences

Schukken, Ynte H., Ph.D., U. of Utrecht. Prof., Population Medicine and Diagnostic Sciences

Schwark, Wayne S., Ph.D., U. of Ottawa (Canada). Prof., Molecular Medicine

Scidmore, Marc, Ph.D., Princeton U. Asst. Prof., Microbiology and Immunology

Scott, Danny W., D.V.M., U. of California at Davis. Prof., Clinical Sciences

Scott, Fredric W., Ph.D., Cornell U. Emeritus Prof., Microbiology and Immunology

Scrivani, Peter V., D.V.M., Cornell U. Lecturer, Clinical Sciences

Sellers, Alvin F., V.M.D., Ph.D., U. of Minnesota. Prof. Emeritus, Biomedical Sciences


Shepard, Laura, D.V.M., Cornell U. Instructor, Biomedical Sciences


Short, Charles E., Ph.D., U. of Turku (Finland). Prof. Emeritus, Clinical Sciences

Simpson, Kenneth W., Ph.D., U. of Leicester (England). Assoc. Prof., Clinical Sciences

Smith, Alison, D.V.M., Iowa State U. Instructor, Clinical Sciences

Smith, Donald F., D.V.M., U. of Guelph (Canada). Dean and Prof., Clinical Sciences

Smith, Mary C., D.V.M., Cornell U. Assoc. Prof., Population Medicine and Diagnostic Sciences

Stokol, Tracy, Ph.D., U. of Melbourne. Asst. Prof., Population Medicine and Diagnostic Sciences

Suarez, Susan S., Ph.D., U. of Virginia. Prof., Biomedical Sciences

Summers, Brian A., Ph.D., Cornell U. Prof., Biomedical 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

Todhunter, Rory J., Ph.D., Cornell U. Assoc. Prof., Clinical Sciences

Torres, Alfonso, Ph.D., U. of Nebraska. Prof., Population Medicine and Diagnostic Sciences

Travis, Alexander, Ph.D., U. of Pennsylvania. Asst. Prof., Biomedical Sciences

Trotter, Eric J., D.V.M., U. of Illinois. Assoc. Prof., Clinical Sciences

Volkman, Dietrich H., B.V.Sc., U. of Pretoria (S. Africa). Assoc. Prof., Clinical Sciences

Warnick, Lorin D., Ph.D., Cornell U. Assoc. Prof., Population Medicine and Diagnostic Sciences

Wasserman, Robert H., Ph.D., Cornell U. James Law Prof. Emeritus Physiology/ Biomedical Sciences

Weiland, Gregory A., Ph.D., U. of California-San Diego. Assoc. Prof., Molecular Medicine

Weiss, Robert, Ph.D., Baylor College of Medicine. Asst. Prof., Biomedical Sciences

White, Maurice E., D.V.M., Cornell U. Prof., Population Medicine and Diagnostic Sciences

Whittaker, Gary R., Ph.D., U. of Leeds (England). Asst. Prof., Microbiology and Immunology

Winand, Nena J., D.V.M., Iowa State U., Ph.D., Cornell U. Asst. Prof., Molecular Medicine

Woodton, John F., Ph.D., Cornell U. Prof., Biomedical Sciences

Xin, Hong-Bo, Ph.D., Beijing Met U. Asst. Prof., Biomedical Sciences

Yen, Andrew, Ph.D., Cornell U. Prof., Biomedical Sciences
PROGRAM OF STUDY

Introduction

The College of Arts and Sciences is a community of about 4,000 undergraduates and 600 faculty members. It is also a graduate school and research center. Altogether it exists within a university of other colleges at Cornell—about 19,000 undergraduate and graduate students and 1,500 faculty members. This wider community provides depth and diversity of applied and professional studies beyond what a college of the liberal arts and sciences alone can offer. Students studying the liberal arts and sciences may draw upon the knowledge and facilities of the other colleges at Cornell to complement their studies. Abundant variety and outstanding quality in many fields, including interdisciplinary fields, and emphasis on individual academic freedom and responsibility give the college and the university its distinctive character.

The richness of the college's undergraduate curriculum is extraordinary; there is no course that all students must take, and there are nearly 2,000 from which they may choose. By choosing courses each semester, students design their own education. They develop known interests and explore new subjects. An education in the liberal arts and sciences means honing one's critical and imaginative capacities, learning about oneself in nature and culture, and gaining experience with views of the world radically unlike one's own. All this is highly individual, and the college relies on each student and faculty adviser to design a sensible, challenging, and appropriate course of study.

Yet the faculty believes that each student's education should have certain common qualities. These include familiarity with several different ways of knowing that are reflected in the various disciplines and fields of study. In addition to these general areas of knowledge, students acquire effective writing and quantitative skills, study foreign languages, achieve cultural breadth, and concentrate on one particular field through which they deepen their imaginative and critical thinking as fully as possible. To accomplish these objectives, the college has certain requirements for graduation.

The College of Arts and Sciences awards one undergraduate degree, the Bachelor of Arts degree

Summary of Requirements

1) First-Year Writing Seminars; two courses. (See John S. Knight Institute for Writing in the Disciplines p. 508.)
2) Foreign language: for graduating classes of 2006 or earlier, proficiency in one language or qualification in two; zero
to four courses. For graduating classes of 2007 or later, completion of one course at the non-introductory level or above (Option I) or at least 11 credits in one language (Option II); one to three courses.
3) Distribution: nine courses (may overlap with courses counting toward a major).
   Please note the two sets of distribution requirements, one for the graduating classes of 2006 and earlier and one for the graduating classes of 2007 and later.
4) Breadth: two courses (may overlap with courses for distribution, major, or electives).
5) Major.
6) Electives: four or five courses (at least 15 credits) not used to fulfill other requirements and not in the major field.
7) Residence: eight full-time semesters, unless a student can successfully complete all other requirements in fewer than eight semesters and meet the additional criteria to accelerate graduation. (See below under "Acceleration.")
8) 34 courses: a three- or four-credit course counts as one course. A two-credit course counts as half a course; a one-credit course does not normally count toward the requirement; a six-credit language course counts as one and one-half courses. (See below under "Courses and Credits" for some one-credit courses in music, dance, and theatre performance that can be cumulated to count as one-half course and for counting five- and six-credit courses.
9) Credits: a total of 120 academic credits, of which 100 must be taken in the College of Arts and Sciences at Cornell. (Please note "Noncredit courses" below for university requirement (passing a swim test and two one-credit nonacademic courses). Please note that physical education credit does not count toward graduation or toward the 12-credit minimum required for good academic standing each semester.
11) Application to graduate. (See below under "Graduation.")

Explanation of Requirements

Foreign Language Requirement

(Please note the different requirements for the classes of 2006 and earlier and the classes of 2007 and later. Placement into language courses is the same for all.) 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 problematics 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, Classics, German Studies, Linguistics, Near Eastern Studies, Romance Studies, and Russian Literature.

For students in the graduating classes of 2006 and earlier, the language requirement may be satisfied in one of two ways:

1) by attaining proficiency (competence at the intermediate level) in one language or
2) by attaining qualification (mastery of an introductory sequence) in two languages.

Proficiency

Proficiency may be attained in languages by passing an intermediate (200-level) Cornell course (or CHIN or JAPAN 161). Introductory courses in some less commonly taught languages are taught at the 200-level or above (for example, ancient Egyptian and Welsh); these do not confer proficiency. Proficiency can also be earned by examination. A score of 4 or 5 on an AP literature exam in French, Italian, or Spanish earns proficiency and three credits. A score of 4 or 5 on the AP exam in German earns proficiency and three credits. Students with those scores should also take the Cornell Advanced Standing Examination (CASE), given during orientation week. To obtain appropriate placement for further study, a student who receives a score of 4 or 5 on an AP language exam can earn proficiency by earning a high score on the CASE. Students with appropriate scores on Cornell Language Placement tests or SAT II examinations are also eligible to take the CASE (see chart below). Native or bilingual speakers and writers of a language other than English may earn proficiency and three credits by taking the CASE or an individual exam (if no CASE is available and a qualified examiner is here).

Qualification

Qualification may be attained in any of the following ways:

1) Three years of high school study in any one language gives qualification in that language. No demonstration of competence is necessary. Note, however, that this route to qualification does not guarantee entrance into an intermediate-level course. Students who want to continue studying the language must be placed in the appropriate course through an examination. Being placed below the intermediate level does not cancel the qualification.
2) Passing the requisite Cornell course, the last course of the introductory sequence.

**Note:** Except in the case of Sanskrit, completion of language sequences 131–132 does not constitute qualification.

3) Achieving the requisite score (see chart) on the SAT II taken in high school or a score of 56 or higher on the appropriate Cornell LP (Language Placement) test.

Students may earn a score of 56 on the placement test at the end of a course numbered 122 (second semester of the introductory sequence) and consequently attain qualification without taking 123, the third semester of the introductory sequence.

4) By departmental or (when no placement test is available) individual examination at Cornell (if a qualified examiner is here).

**For students in the graduating classes of 2007 and later:**

**Option 1:** Passing a) a nonintroductory foreign language course at Cornell at the 200 level or above or b) any other nonintroductory course conducted in a foreign language at Cornell.

**OR**

**Option 2:** Passing at least eleven credits of study in a single foreign language at Cornell. Students undertaking intensive introductory language study elsewhere should consult the relevant department about applying that study toward Option 2. In most cases this will require satisfactory performance on an examination.

Students whose speaking, reading, and writing competence in a language other than English is at the same level we would expect our entering freshmen to have in English (as shown by completing high school in that language or by special examination 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). Students may, but need not, retake a language test if a year or more has passed since last taking it. 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 placement test if the instructor deems the student not adequately prepared for the level in which s/he has enrolled.

### French

**Placement Tests**

<table>
<thead>
<tr>
<th>Language Courses</th>
<th>SAT II</th>
<th>Literature Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>below 37</td>
<td>below 410</td>
<td>121</td>
</tr>
<tr>
<td>37–44</td>
<td>410–480</td>
<td>112 or 122</td>
</tr>
<tr>
<td>45–55</td>
<td>490–560</td>
<td>123</td>
</tr>
<tr>
<td>56–64</td>
<td>600–680</td>
<td>206</td>
</tr>
<tr>
<td>65 and above</td>
<td>690 and above</td>
<td>CASE required for placement in language.</td>
</tr>
</tbody>
</table>

**AP 4 or 5 in language:** 3 credits CASE required for placement in language.

**AP 4 or 5 in literature:** 3 credits CASE recommended for placement.

### German

**Placement Tests**

<table>
<thead>
<tr>
<th>Language Courses</th>
<th>SAT II</th>
<th>Literature Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>below 37</td>
<td>below 370</td>
<td>121</td>
</tr>
<tr>
<td>37–44</td>
<td>370–450</td>
<td>122</td>
</tr>
<tr>
<td>45–55</td>
<td>460–580</td>
<td>123</td>
</tr>
<tr>
<td>56–64</td>
<td>590–680</td>
<td>200</td>
</tr>
<tr>
<td>65 and above</td>
<td>690 and above</td>
<td>CASE recommended for placement in language.</td>
</tr>
</tbody>
</table>

**AP 4 or 5 in language:** 5 credits CASE recommended for placement in language.

**AP 4 or 5 in literature:** 3 credits CASE recommended for placement.

### Italian

**Placement Tests**

<table>
<thead>
<tr>
<th>Language Courses</th>
<th>SAT II</th>
<th>Literature Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>below 37</td>
<td>below 370</td>
<td>121</td>
</tr>
<tr>
<td>37–44</td>
<td>370–450</td>
<td>122</td>
</tr>
<tr>
<td>45–55</td>
<td>460–580</td>
<td>123</td>
</tr>
<tr>
<td>56–64</td>
<td>590–680</td>
<td>209</td>
</tr>
<tr>
<td>65 and above</td>
<td>690 and above</td>
<td>CASE recommended for placement in language.</td>
</tr>
</tbody>
</table>

**AP 4 or 5 in language:** 5 credits CASE recommended for placement in language.

**AP 4 or 5 in literature:** 3 credits CASE recommended for placement.

### Spanish

**Placement Tests**

<table>
<thead>
<tr>
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<th>SAT II</th>
<th>Literature Courses</th>
</tr>
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<td>370–450</td>
<td>112</td>
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<tr>
<td>45–55</td>
<td>460–580</td>
<td>122</td>
</tr>
<tr>
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<td>590–680</td>
<td>200</td>
</tr>
<tr>
<td>65 and above</td>
<td>690 and above</td>
<td>CASE recommended for placement in language.</td>
</tr>
</tbody>
</table>

**AP 4 or 5 in language:** 3 credits CASE recommended for placement in language.

**AP 4 or 5 in literature:** 3 credits CASE recommended for placement.
Placement Tests and Advanced Placement Credit

1) The following language placement and advanced standing tests are scheduled at the beginning of each semester:

- Chinese, Japanese, and Korean (schedule available from the Department of Asian Studies, 350 Rockefeller Hall);
- German (schedule available from the Department of German Studies, 183 Goldwin Smith Hall);
- French, Italian, and Spanish (schedule available from the Department of Romance Studies, 505 Morrill Hall);
- Russian (schedule available from the 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 Eleanor Drozer in 414 Morrill Hall. 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 and modern: 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.

Substitutions to the Language Requirement

Outright waivers of the requirement are never granted. However, rarely and as appropriate, legitimate requests for substitutions are approved. Legitimate requests for substitutions require evidence of inability to learn foreign languages in a classroom setting. Most students provide documentation of learning disabilities relating to foreign language acquisition (e.g., an auditory processing problem) to Student Disability Services, 420 Computing and Communications Center, 255-4545. Other students who may never have been tested for a disability reveal it through repeated and dedicated but vain attempts in formal language courses. A poor grade in a Cornell introductory language course or taking the LP exam repeatedly and unsuccessfully is not adequate evidence of disability. Such students should consult the Office of Disability Services.

Students who wish to request a substitution for the normal requirement should meet with Dean Peggy Walbridge, Office of Undergraduate Admissions and Advising, 172 Goldwin Smith Hall. If Dean Walbridge determines that the request has merit, the student meets with the Language Substitution Review Committee. This committee makes the final decision for or against a substitution. If a substitution is allowed, the committee works with the student to select appropriate substitute courses.

Placement in Language Courses and Advanced Placement Credit

Placement into language courses and advanced placement credit are separate results of examinations.

Distribution Requirements

( Please note the different requirements in the arts, humanities, and social sciences for the graduating classes of 1996 and earlier and the graduating classes of 2007 and later. The science and quantitative reasoning requirement is the same for both groups.)

In satisfying the distribution requirements, students become acquainted with a broad range of subject matter and points of view among disciplines in the college and explore areas that may be entirely new to them. Or, to look at it the other way, as first-year students explore subjects that interest them, they begin to satisfy distribution requirements. Consequently, first-year students should take courses to prepare for possible majors and to explore subjects new to them and take no course only in order to satisfy a distribution requirement. Although students may complete distribution requirements over eight semesters, they can take advanced courses in subjects they (perhaps unexpectedly) find intriguing only if they have completed the introductory prerequisites. Consequently, students should not postpone satisfying distribution requirements until the last semesters. Once sure of a major, students should consider which distribution requirements are yet unfulfilled and how to fulfill them with courses that complement their overall program.

Students in the graduating classes of 2006 and earlier must take a total of nine courses of three or more credits each for the distribution requirements: four courses from Groups I (science) and II (quantitative reasoning) below, at least two of which are from Group I and at least one of which is from Group II (for example, one chemistry, one physics, one geology, and one mathematics); five courses from Groups III (society and science) and IV (humanities and the arts) below, with at least two of which are from Group IV and at least one of which is from Group I (for example, one course in sociology, one in history, one in history of art, and two in theater arts). Courses that satisfy distribution requirements are listed and described in their departmental sections. The Roman numeral—I, II, III, or IV—indicates which group each course satisfies. If there is no numeral at all, the course satisfies no distribution requirement. 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).

I. Physical and Biological Sciences

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

427 Fundamentals of Endocrinology

Anthropology

275 Human Biology and Evolution
371 Human Paleontology
474 Lab and Field Methods in Human Biology

Applied & Engineering Physics

470 Biophysical Methods

Astronomy: all 3- or 4-credit courses

Biological Sciences: all 3- or 4-credit courses (including any combination of courses from BIO 101-104) except BIO G 200, BIO G 299, BIO G 498, and BOSM 204. BIO G 200 and BIO G 499 require permission from the Office of Undergraduate Biology.

Biological & Environmental Engineering

456 Biomechanics of Plants

Biology & Society:

214 Biological Basis of Sex
461 Environmental Policy

Chemistry and Chemical Biology: all courses

Cognitive Studies:

111 Brain, Mind, and Behavior
330 Introduction to Computational Neuroscience

Crop Science:

398 Environmental Microbiology

Earth and Atmospheric Sciences: all courses except 150, 250, 435

Entomology:

400 Insect Development
452 Herbivores and Plants
453 Princ/Pract Historical Biogeography
455 Insect Ecology
456 Stream Ecology

Feminist, Gender, and Sexual Studies:

214 Biological Basis of Sex

Food:

394 Applied and Food Microbiology

History:

287 Evolution

Horticulture:

243 Taxonomy of Cultivated Plants

Natural Resources:
456 Stream Ecology

Nutritional Science:

275 Human Biology and Evolution
475 Mechanisms of Birth Defects

Physics: all courses except 205, 209

Plant Pathology:

407 Nature of Sensing and Response

Psychology:

111 Brain, Mind, & Behavior
322 Hormones and Behavior
324 Biopsychology Laboratory
The following departments are included in Group III, social sciences and history.

Most (although not all) courses in these departments satisfy distribution in this group. Students should consult the departmental listings for options that are noted as satisfying Group III.

- Anthropology
- Economics
- Government
- History
- Linguistics
- Psychology
- Sociology

In addition, interdisciplinary departments and programs offer courses in Group III. Again, students should consult the departmental and program listings and note which courses satisfy Group III.

- Africana Studies
- American Studies
- Archaeology
- Asian Studies
- Asian American Studies
- Biology and Society
- Cognitive Studies
- Feminist, Gender & Sexuality Studies
- Near Eastern Studies
- Religious Studies
- Science and Technology Studies

Finally, CRP 100 (The American City) and CRP 101 (Global City) and ENGRG 250 (Technology in Society) and ENGRG 298 (Inventing an Information Society) satisfy distribution in Group III.

IV. Humanities and the arts

The following departments are included in Group IV, humanities (literature and philosophy) and the arts. While language and logic courses do not count for distribution in this group, most (although not all) other courses in these departments do. Students should consult the departmental listings for options that are noted as satisfying Group IV.

- African Studies
- Classics
- Comparative Literature
- English
- German Studies
- History of Art
- Music: If a student applies one course in music toward distribution, it must be in music history, culture, or theory. If a student applies more than one course, an acceptable sequence may include four credits (two half courses) in musical performance, organizations, or ensembles combined with theory, history, and culture courses. Students may count performance credits as only one course toward distribution.

- Philosophy
- Romance Studies (French, Italian, and Spanish Literature)
- Russian Literature
- Theatre, Film, and Dance

In addition, the following interdisciplinary departments and programs offer courses in Group IV. Again, students should consult the departmental and program listings to find which courses satisfy Group IV.

- Africana Studies
- American Studies
- Anthropology

Cognitive Studies:
- 172 Computation, Information, and Intelligence
- 424 Computational Linguistics
- 476 Decision Theory

Computer Science:
- 100 Introduction to Computer Programming
- 172 Computation, Information, and Intelligence
- 211 Computers and Programming
- 280 Discrete Structures
- 312 Structure and Interpretation of Computer Programs
- 321 Numerical Methods in Computational Molecular Biology
- 424 Computational Linguistics
- 486 Applied Logic

Ecology and Evolutionary Biology:
- 362 Dynamic Models in Biology

Earth and Atmospheric Science:
- 435 Statistical Methods in Meteorology and Climatology

Economics:
- 519 Introduction to Statistics and Probability
- 320 Introduction to Econometrics
- 421 Applied Econometrics
- 325 Cross Section and Panel Econometrics
- 368 Game Theory
- 405 Auction Seminar
- 431 Monetary Economics
- 470 Economics of Information
- 476/477 Decision Theory

Engineering:
- 115 Engineering Applications of OR&IE
- 172 Computation, Information, and Intelligence
- 521 Numerical Methods in Computational Molecular Biology

Industrial and Labor Relations:
- 210 Statistical Reasoning I
- 211 Statistical Reasoning II

Linguistics:
- 424 Computational Linguistics
- 485 Topics in Computational Linguistics

Mathematics:
- all courses except 101 and 109

Philosophy:
- 231 Introduction to Deductive Logic
- 331 Deductive Logic
- 483 Choice, Chance, and Reason
- 431 Mathematical Logic
- 452 Topics in Logic
- 456 Intensional Logic

Physics:
- 205 Reasoning about Luck
- 209 Relativity and Chaos

Psychology:
- 350 Statistics and Research Design

Sociology:
- 501 Evaluating Statistical Evidence

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: Biometry 301, formerly 261 (Statistical Methods I), CRP 223 (Intro to Statistical Reasoning), ECON 321 (Applied Econometrics), IILR 210 (Statistical Reasoning I), MATH 171 (Statistical Theory and Application in the Real World), PSYCH 350 (Statistics Research and Design), SOC 301 (Evaluating Statistical Evidence).
Arts 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, stigma, conflict resolution).

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 twentieth 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 requirements in areas, such as the social sciences, which include the categories of CA, HA, KCM, LA, and SBA.

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, to design their own major. To apply, they take a copy of their official transcript when they are 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. However, for students in the graduating classes of 2006 or earlier, courses offered or cross-listed by their major department may be counted only toward the distribution category of the major department itself. For example, a history major may not count a course cross-listed between history and a literature department toward distribution in the humanities.

The Major

In their last two years, students devote roughly one-half 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 who transfer to the college from another institution are under the above rules for advanced placement credit, but are eligible to have credit for post high school coursework 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.

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adviser, an independent major that includes courses from several departments and even colleges. See "Independent Major Program under "Special Academic Options." Whatever the major—chemistry, math, philosophy, or music—graduates from the College of Arts and Sciences earn one the 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 procedures are required; students simply become accepted into multiple majors and find an adviser in each department. All completed majors are posted on the official transcript. However, even though courses in a second major count among the required 15 credits of electives (see immediately below), double majoring can constrict the variety of electives that might be valuable for an education in the liberal arts and sciences. Students should "double major" only if their intellects and deep interests direct them to do so.

**Electives**
Of the 34 courses and 120 credits required for graduation, almost one-third are free electives. How students use these electives frequently makes a 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 concentrations or may form their own unofficial concentration or "minor" separate from their major. Students may also group electives into a second major. Since only one major is required, students may count courses in a second major as electives. Some students choose to explore a variety of subjects; some develop a concentration in a department or subject outside Arts and Sciences to gain applied training or specialized knowledge.

**Residence**
The College of Arts and Sciences is a residential community for students who devote their energy and spirit to full-time study. The faculty believes that integrated, full-time study for a defined period best promotes intellectual and creative development and best prepares people for citizenship and careers. Consequently, eight semesters of full-time study in the College of Arts and Sciences are integral to earning the B.A. degree. Even if the minimum requirements can be met in fewer semesters, the faculty of the college expects students to take advantage of the resources of the university for eight full terms and obtain as rich and advanced an education in the liberal arts and sciences as possible. Students may complete their undergraduate degrees with credits earned at other institutions or as part-time or summer students at Cornell only if they have completed their eight full-time semesters of residence or satisfied the criteria listed below under "Part-time study in final semester."

For transfer students from other institutions, each full semester of study at their previous institution counts as one of the eight semesters of residence. However, even if transfer students have completed more than four full semesters at their previous institution, they must spend a minimum of four semesters on the Cornell campus in Ithaca enrolled in the College of Arts and Sciences. Internal transfers from other colleges at Cornell must spend four semesters on campus in Ithaca as students in the Internal Transfer Division or in the college.

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.

Semesters 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**
Some students decide that they do not need eight semesters of residence to obtain a solid undergraduate education. These students must compress the required years and spend four full semesters in the major. Benefiting from opportunities for advanced, seminar, and independent (sometimes honors) work is what best characterizes undergraduate education in the college. Students considering acceleration should discuss their plans with their major adviser.

Accelerants apply to graduate one semester before their intended new graduation date. They obtain an "Application to Graduate" for this purpose in the Office of Undergraduate Admissions and Advising, 55 or 172 Goldwin Smith Hall. Accelerants must complete:

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 prerequisite or admission to the major in time to spend four semesters in the major.
   b. 48 credits in College of Arts and Sciences courses numbered "300" and above and prerequisites for admission to the major in time to spend four semesters in 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 in summer or winter session, 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 freshmen may not compress their undergraduate education into fewer than six semesters of residence. Transfer students, both from other colleges at Cornell 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 term**
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 term to graduate should complete the outstanding courses and pay prorated tuition. Students may spend a ninth term 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 unprepared 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 or 172 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 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 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.

Students requesting this because of documented disabilities that, under the Americans with Disabilities Act, require appropriate accommodations, should discuss their situation with Dean Walbridge. Otherwise, students should meet with a dean of their class.

**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 term, 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. Theses are welcome to visit courses and at least one additional course.

Students must obtain approval of an advising dean and complete the pro-rated tuition form in the semester before or during the first three 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 and credits

Students must complete at least 34 courses to graduate. Half of the total of four courses during each of six semesters and five courses during each of the two semesters. A three- or four-credit course counts as one course; a two-credit course counts as one-half course.

Single-credit courses do not count as part of the 34 except in certain cases when they form a part of a series and two in the same series can be aggregated to count as one-half course (certain offerings in the Department of Music and Theatre. Einstein and Dance fall into this category). Three one-credit courses do not aggregate to count as one course. A six-credit language course counts as 1 1/2 courses, while the summer FALCON Programs in Asian languages count as eight credits and two courses each and regular semester FALCON counts as 16 credits and four courses. Archaeology and geology fieldwork for more than six credits credits as two courses each. BIOGD 281 counts as 1 1/2 courses. Other five- or six-credit courses count as one course. Courses students place out of with AP credit count toward the 34.

Students must also complete 120 credits, 100 of which must be from courses taken in the College of Arts and Sciences at Cornell. Liberal arts courses approved for study abroad during a semester or academic year of full-time study (not summer study) and courses taken in certain off-campus Cornell residential programs may be counted toward the 100 credits required in the college. Advanced placement credits, credits earned in other colleges at Cornell, or credits earned in any subject at institutions other than Cornell do not count as part of the 100. The only exceptions to the above restrictions are for 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 for up to two courses that an adviser accepts as part of a completed and formally established cross-college, interdisciplinary concentration.

Using courses toward more than one requirement

A course may fulfill more than one college requirement in the following situations:

1) A course may be used to fulfill a distribution, breadth, and also a major requirement (except as noted under previous section of 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 achieving proficiency or certifying Option I in that language may also be applied to the relevant distribution requirement and, if appropriate, to the breadth requirement.

3) Courses may count toward breadth requirements and toward any other requirement except First-Year Writing Seminars.

4) Courses in a second major may count as electives.

Auditing

The college encourages its students to take advantage of its rich curriculum by sitting in on courses that interest them but that they prefer not to take for credit. As long as the instructor agrees, students are welcome to visit courses. Small seminars and language courses are sometimes not open to visitors. Audited courses do not appear on the student’s schedule or transcript.

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; students considering repeating a course under this circumstance should discuss the matter with their adviser and an advising dean. Students who plan to repeat a course 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.

Courses that do not count toward the degree

The college does not grant credit toward the degree for courses completed before matriculation in a summer session. Credit for courses completed before matriculation in a summer session away from Cornell should obtain approval forms as soon as possible and have transcripts sent to Robin Perry, 172 Goldwin Smith Hall. Credits completed in Cornell summer sessions will be awarded automatically.

Summer session credit

Summer session credit may be applied to part of the Group I and II distribution requirements. For all students, it may not be applied to breadth requirements but may be applied to elective requirements and to major requirements (with the approval of the department).

Summer session at Cornell or elsewhere does not count toward the eight-semester residence requirement. Students are permitted to earn up to 12 credits in one summer.

Transferring credit earned away from Cornell while on leave of absence

See “Leaves of Absence” section.

Transferring credit (for transfer students from another institution or from another Cornell college)

Transfer students must satisfy all normal requirements for the degree, including eight semesters of full-time study. They must always complete at least 60 credits and 16 courses at Cornell and be in residence on campus in the college for at least four regular semesters (summer session does not count toward the residence requirement). The college evaluates credit and residence earned either at another school or college at Cornell University or at another accredited institution of collegiate rank and determines the number of credits and courses the student may apply toward the various requirements for the Bachelor of Arts degree at Cornell. In addition, it reevaluates advanced placement credit allowed by another institution, including another college at Cornell. Evaluations of transfer credits are normally provided when students are notified of their admission. Once matriculated in Arts and Sciences at Cornell, transfer students must
adhere to the same rules for transferring credit earned on leave as all other students.

SPECIAL ACADEMIC OPTIONS

Degree Programs
The following five 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 adviser, a well-designed program of study. College Scholars design idiosyncratic programs: some pursue diverse interests and majors; 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, 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. They must, however, also complete the university's physical education requirement. 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 in April of the freshman year. Students should contact Dean Ken Gabard, Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall, for further information.

Dual-Degree Program with Other Colleges
The Dual-Degree Program enables especially ambitious undergraduate students to pursue programs of study in two colleges. Dual-degree candidates may earn both a Bachelor of Arts degree from the College of Arts and Sciences and: 1) a Bachelor of Science degree from the College of Engineering; or 2) a Bachelor of Fine Arts degree from the Department of Art in the College of Architecture, Art, and Planning; or 3) a Bachelor of Science degree in urban and regional studies from the Department of City and Regional Planning in the College of Architecture, Art, and Planning; or 4) a Bachelor of Science degree in architectural history from the Department of Architecture in the College of Architecture, Art, and Planning.

Students enter one of these colleges as freshmen or sophomores and begin the Dual-Degree Program with the second college in the second or, in some cases, the third year. The Dual-Degree Program ordinarily takes five years to complete, and students are eligible for ten 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 adviser and are assessed by a board of faculty members. Independent majors substitute for established majors, but still satisfy all the other requirements for the Bachelor’s degree. Students should contact Dean Stephen Friedfeld, Office of Undergraduate Admissions and Advising, 172 Goldwin Smith Hall, for further information. Deadlines for submitting independent major proposals are listed on the calendar supplement for the College of Arts and Sciences.

Double Registration with and Early Admission to Professional Schools
Registration by the second year of the College of Arts and Sciences and the first year of Cornell Law School or the Johnson Graduate School of Management is occasionally possible. A very few exceptionally well-prepared candidates 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 eight or fewer credits and two or fewer courses to complete may apply to enter the Master’s of Engineering program during the fall or spring of 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 or the Graduate School of Management or in one 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 one of the sciences, while taking education courses. They are then able to complete a Master of Arts in Teaching (MAT) in one year and earn certification in New York State.

For more information, contact the program coordinator at 255-3975.

Special-Interest Options
The following options enable students to pursue special interests within the usual degree programs.

Concentrations
Established interdisciplinary concentrations, described in alphabetical order along with departments in the pages following, provide structures for organizing electives. Completed concentrations are noted on the transcript.

Informal Minors
Some students organize electives within a discipline or department in Arts and Sciences or another college. Such informal minors can be developed with the help of the departmental directors of undergraduate studies. They are not noted on the transcript.

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 forms are available on-line at www.arts.cornell.edu and in the Office of Undergraduate Admissions and Advising, 55 and 172 Goldwin Smith Hall. In one semester students may earn up to eight credits with one instructor or up to eight credits with more than one instructor.

Undergraduate Research Program
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 Undergraduate Research Program gathers information about research opportunities in most disciplines of the liberal arts and sciences, guides students in finding further opportunities—on campus and elsewhere and during the academic year and the summer—and helps students prepare for research and presenting themselves as candidates for apprenticeships. Other students locate research opportunities independently through faculty whose courses they have taken, through their major departments, or through published materials.

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.

Students interested in this program should consult Dean David DeVries in the Office of Undergraduate Admissions and Advising, 172 Goldwin Smith Hall.

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, 350 Rockefeller Hall; e-mail falcon@cornell.edu.

Language House Program
A complement to classroom cultural and linguistic instruction, the Language House Program combines residential and academic opportunities for developing and practicing conversational skills in French, German, Italian, 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 see Clare McMillan, 726 University Ave.

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, 61 Goldwin Smith Hall.

The college offers a concentration 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 adviser 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 twenty-first century. Study abroad is open to students in any major and the college requirements and have a strong academic goal. Well-chosen and well-planned study abroad contributes a global or comparative dimension to your chosen field, enhances critical thinking and communications skills, and provides firsthand immersion in and appreciation of another culture. Focused academic work in the right institution abroad can be excellent preparation for advanced study or honors work in your final semesters at Cornell, and can lead to a career with a global component.

Requirements
• acceptance into a major
• area-studies course work
• fulfillment of the College of Arts and Sciences residence requirement
• GPA of 3.0 or higher and good academic standing
• language study at the required level

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 which 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 another language is not English, you 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 your 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 compete 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 your proposed host country, you may be approved for a program that combines intensive language instruction with substantial 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. 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 you enroll in be in an advanced-level course work in your major field.

You will need to acquire background knowledge of the country or region where you 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 (for example, 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. If you intend to enhance your major with study abroad, you 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 you intend to earn major credit, the college requires that time spent abroad will not impede your progress toward the degree. Your faculty advisor and departmental director of undergraduate studies must review and approve your study-abroad plans before you submit your application to the college.

Study abroad can earn up to 15 A&S credits per semester of full-time course work as long as the curriculum abroad is consistent with that of the college. Completion of one trimester of study earns a maximum of 10 credits. Two terms at Oxford or Cambridge may earn up to 20 credits. You must carry a full course load as defined by the host institution, which should be equivalent to at least 15 credits at Cornell, and all courses must be taken for a letter grade. Courses that fall outside the scope of the liberal arts and sciences may be only taken with the prior approval of Dean Wasyliw, and will earn non-A&S credits. Some foreign universities offer courses for visiting students that do not carry any academic credit. Students may not earn additional credit for enrolling in extra courses during the semester or year abroad.

Credit for study abroad will be awarded only after completion of the term abroad, and after the college receives your official transcript. To receive credit, you must fill out a Request for Credit from Study Abroad form and submit it to the advising office along with a copy of your 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. You must save all written work from all courses until your grades are received and recorded on your 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
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 policies about academic integrity and be sure they understand the expectations in individual courses as well. When in doubt, ask the instructor.

ADVISING

The following advisers and offices provide academic advising, help with problems, and information on college procedures and regulations.

Faculty Advisers

Each new student is assigned a faculty adviser. Advisers help students plan programs of study and advise them about ways to achieve their academic goals. Advisers 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 advisers recognize and address problems early.

Advisers and new advisees meet first during orientation week to discuss course selection. New students are encouraged to see their advisers again early in the term, before it is too late to drop courses, to discuss their academic progress and to become better acquainted. Advisers and advisees meet at least once each semester to discuss courses for the following term, and more often if advisees wish to discuss academic or personal issues or to petition for an exception to college rules.

Student Advisers

Student advisers pass on lore about the college and life at Cornell and help new students understand requirements and negotiate the university.

Major Advisers

After acceptance into a major, students are assigned a major adviser, a faculty member in the major department, with whom they shape and direct their course of study. The adviser eventually certifies the completion of the major. Students should consult their major adviser about all academic plans, including honors, study abroad, acceleration, and graduate study. The adviser's support is especially important if a student petitions for an exception to the normal procedures or requirements.

ACADEMIC INTEGRITY

Academic integrity is the heart of intellectual life—both in learning and in research. All members of the university community simply

Office of Undergraduate Admissions and Advising

This office, 55 Goldwin Smith Hall, 255-5004 and 172 Goldwin Smith Hall, 255-4833, is a resource for faculty and student advisers and for individual students and their parents.

Advising deans are available to help students define their academic and career goals, to help with special academic options and exceptions to college rules, and to help when problems arise.

David DeVries, associate dean for undergraduate admissions and advising and undergraduate research—255-3386

Yolanda Clarke, juniors, seniors, internal transfers, and minority students—255-4833

Maria Davidis, juniors, seniors, Dean’s Scholars, Cornell Presidential Research Scholars Fellowships, and Mellon Fellows—255-4833

James Finlay, first- and second-year students, Dean’s Scholars, Cornell Presidential Research Scholars Fellowships, undergraduate research—255-5004

Stephen Friedfield, Independent Major Program and student ambassadors—255-4833

Ken Gable, first- and second-year students and College Scholar Program—255-5004

Lisa M. Harris, career services and pre-law advising—255-6926

Irene Konor, career counseling—254-5295

Clare McMillan, Language House Program—255-6543

Diane J. Miller, career services—255-6924

Sally O’Hanlon, registrar—255-5051

Janice Turner, minority students and pre-med advising—255-9497

Catherine Wagner, juniors, seniors, and dual-degree students—255-4833

Peggy Walbridge, juniors, seniors, transfer students, and students with disabilities—255-4833

Patricia Wasylik, first- and second-year students, academic integrity, study abroad, and student advisers—255-5004

Committee on Academic Records

The college faculty’s standing Committee on Academic Records has two main tasks: 1) to decide on students’ petitions for exceptions to college requirements or rules and 2) to review the records of students who fail to maintain good academic standing and to take appropriate action. It accomplishes both those tasks without formulae and with attention to each individual situation. Its overriding goal is to help students achieve the best undergraduate education possible.

Petitions

The college faculty takes graduation requirements seriously, and the faculty’s Committee on Academic Records virtually never waives a requirement outright.

However, some students, with the support of their advisers, propose structuring their educations or fulfilling the spirit of college requirements in ways other than the specified norms. The Committee on Academic Records
decides on such requests. If you find that your undergraduate education would be better realized by satisfying requirements or proceeding in a way that requires an exception to normal rules, you should meet with an advising dean in the Office of Undergraduate Admissions and Advising. The deans are expert in the college’s expectations and procedures and can help you formulate a petition, if appropriate. The committee decides petitions on the basis of their educational merit.

### Actions

The College of Arts and Sciences has no minimum grade requirement for graduation beyond the guideline that at least 100 Cornell credits of the 120 total required for graduation be passed with grades of C (not C-) or above. Consequently, only through actions of the Committee on Academic Records, described below under Academic Standing, does the college maintain the quality of the degree and attend to individual situations when things academic are not going well.

### REGISTRATION AND COURSE SCHEDULING

#### Enrollment in Courses in the College of Arts and Sciences

**New Students**

During orientation week, new students attend briefings and other information sessions, meet with faculty advisers, 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 prior to 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 term 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 advisers. 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 term, students find their course schedules “Just the Facts.” Periodically during the term, 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. (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 twelve degree credits per semester; if for compelling personal or academic reasons students need to carry fewer than 12 credits, they should consult their faculty adviser and an advising dean. Permission is by petition only, and it is freely given for first-year students.

### Maximum number of credits per semester

First-term freshmen must petition to register for more than 16 credits; other students may register for up to 22 credits if their previous term’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 credits for the semester toward the degree.

#### Attendance

Attendance in classes is expected. Absences are a matter between students and their instructors. If a student cannot attend classes because of illness or family crisis, the Office of Undergraduate Admissions and Advising will notify instructors at the request of the student or the family. Nonetheless, the student must arrange to make up examinations or other work with each instructor. A student who will be absent because of religious holidays or athletic competitions must discuss arrangements for making up work with his or her instructors well in advance of the absence. A student who must miss an examination must also consult with the professor in advance. Alternative arrangements are at the discretion of the instructor.

Student athletes should discuss scheduled absences with their instructors at the beginning of the term. 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 seventh week of the term 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 term, if the department approves and no issue of academic integrity is at stake. Between the seventh and twelfth weeks students may petition to withdraw from courses if: 1) the instructor approves; 2) the adviser 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 make an advising dean a request to obtain petition forms.

Courses officially dropped after the seventh week will be noted on the transcript by a “W” where the grade would normally appear. This is a matter of record and cannot be petitioned. Petitions to withdraw from courses may not be considered after the end of the twelfth week in the term. Deadlines for short courses will be adjusted according to the length of the courses.

### Leaves of Absence (LOAs)

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 should consult with an advising dean in the Office of Undergraduate Admissions and Advising, 55 or 172 Goldwin Smith Hall.

Students sometimes find it necessary to take a leave of absence at some point during the semester. In addition to the serious financial consequence of taking leaves after the semester has begun (see the Proration Schedule for Withdrawals and Leaves of Absence in the General Information section of this catalog), all leaves taken during the semester are granted at the discretion of the college. Please discuss your 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 below, under Return from Leave). Readmission is automatic upon written request made by August 1 for a fall term, or January 1 for a spring term.

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 terms and/or until specific and individual conditions, such as completing unfinished work, have been met. Students may be granted conditional leaves after the twelfth week of a term 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, 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 in order to be re admitted to study. Students wishing to return from a medical leave should contact Gannett several months in advance to initiate the
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 of absence but who register for a term 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 many students whose intellectual interests change (or become more focused). Students who want to transfer should discuss their eligibility with a counselor in the new school or college.

In some cases, students who want to transfer into the College of Arts and Sciences may transfer directly. In other cases, they may be referred to the Internal Transfer Division. During the term 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 academic 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 better. Interested students should see Dean Yolanda Clarke, 172 Goldwin Smith Hall.

GRADUATING STUDENTS

ACADEMIC STANDING
Students are in good academic standing for the term if they successfully complete at least 12 degree credits by the end of the term and earn no more than one D and no F or U grades. If a student completes only three courses, all grades must be above D. In addition, students are expected to make satisfactory progress toward satisfying requirements for the degree and to earn grades of C (not C-) or better in at least 100 of the 120 credits for the degree. Courses listed under “courses that do not count toward the degree” do not count toward good academic standing in a semester.

Academic Actions
Students who are not in good academic standing will be considered for academic action by the college faculty’s Committee on Academic Records or by one of the advising deans of the college. Students are urged to explain their poor academic performance and submit corroborating documentation. Students may appeal a decision or action of the committee by submitting a written 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.

S-U Grades
The S-U (satisfactory-unsatisfactory) option allows students to compete with better-prepared students for admission to graduate and professional schools and to reduce pressure to achieve a certain grade level. Students who are repeating a course, who have already received a grade for a course, or who are attempting to pass a course for which they received a grade of S-U in the past are not eligible for this option.

The S-U (satisfactory-unsatisfactory) option may be used for the first time only in courses that the student believes are sufficiently different from the previous course offerings to justify the use of the S-U option. After the student has used the S-U option for the first time in a course, the student is not eligible to use the S-U option in that course again.

Students who choose to use the S-U option in a course will receive an S-U grade. The S-U option is contingent upon the student's approval of the S-U grade by the Academic Records office. The student must be satisfied with the S-U grade and may request a grade change to S-U within the prescribed time frame. The student may not change their grade to S-U or from S-U after the specified deadline.

Warning
Any student who fails to maintain good academic standing will, at a minimum, be warned. A warning is posted on a student's official transcript. The faculty Committee on Academic Records may require a student to refrain from enrolling in any classes for one term 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.

Forgery or Fraud on Forms
Forging signatures or credentials on college forms is an academic offense; sometimes it constitutes academic fraud. In all cases of forgery on academic forms, the effect of the forged documents shall be negated. Students may then petition properly to do whatever they attempted to do improperly. Such incidents will be recorded in the Academic Integrity Hearing Board’s confidential file for forgeries. If a student forges more than once or if the forgery would advance the student’s academic standing unfairly or fraudulently, or if for any other 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.

GRADUATING STUDENTS

Letter Grades
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 term. Virtually no exceptions to this deadline are permitted, and consequently students adding courses after the third week of the term must add them for a letter grade. A grade of S is equivalent to a grade of C− or higher, a grade of U, which is equivalent to any grade below C−, is a failing grade equal to an F. S means the student receives the credit specified for the course. U means no credit is given. A few courses in the college are graded exclusively S-U; in that case, the final grade appears on the transcript as SX or UX.

Prerequisite courses for graduate school and courses counting toward the major should not be taken for an S-U grade, unless the department grants permission. Students may elect the S-U option in courses used to satisfy distribution and elective requirements, provided that such courses do not also count toward major requirements or serve as prerequisites for graduation 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 term 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 term 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
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 term evaluates the student's performance in the course for the entire year.

Grade Reports
Grade reports are available on-line on Just the Facts; they are not mailed to students. Students should periodically check their courses and grades to be sure that they are recorded correctly.

Class Rank
The college does not compute class rank.

Dean's List
Inclusion on the Dean's List is an academic honor bestowed by the dean of the college semester by semester. Based on grades, the criteria include about the top 30 percent of students and vary with the number of credits the student completes. The criteria are subject to slight changes from semester to semester and are available at www.arts.cornell.edu/stu-adv/deanlist.asp and in the Office of Undergraduate Admissions and Advising, 55 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 attend senior briefings and then complete an application to graduate. The application allows the college to check each student's plan for fulfilling college requirements. This process is intended to help seniors identify problems early enough in the final year to make any necessary changes in course selection to satisfy those requirements. Nonetheless, meeting graduation requirements is the student's responsibility: problems that are discovered, even late in the final term, 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 May and 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 upon 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) ranked 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 terms.

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>Event</th>
<th>Fall 2005</th>
<th>Spring 2006</th>
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<tbody>
<tr>
<td>Last day for adding courses without petition.</td>
<td>Sept. 17</td>
<td>Feb. 11</td>
</tr>
<tr>
<td>Last day for adding a First-Year Writing Seminar.</td>
<td>Sept. 10</td>
<td>Feb. 4</td>
</tr>
<tr>
<td>Last day for changing grade option to S-U or letter.</td>
<td>Sept. 17</td>
<td>Feb. 11</td>
</tr>
<tr>
<td>First deadline for submitting independent major requests.</td>
<td>Sept. 27</td>
<td>Feb. 21</td>
</tr>
<tr>
<td>Last day for dropping courses without petition.</td>
<td>Oct. 15</td>
<td>March 11</td>
</tr>
<tr>
<td>Last day to petition to withdraw from a course.</td>
<td>Nov. 19</td>
<td>April 22</td>
</tr>
<tr>
<td>Second deadline for submitting independent major requests.</td>
<td>Nov. 29</td>
<td>April 4</td>
</tr>
<tr>
<td>Deadline for requesting internal transfer to the College of Arts and Sciences for the following term.</td>
<td>Dec. 4</td>
<td>May 7</td>
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</table>

Honors
Bachelor of Arts with Honors
Alm...
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.

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 concentration program. This program enables the student to complete a major in any of the other disciplines represented in the college while at the same time fulfilling requirements for a minor in Africana Studies. This requires only a few more credits than is usually the case when one completes a single major course of study. Courses offered by the center are open to both majors and nonmajors and may be used to meet a number of college distribution requirements, including historical/temporal breadth (#) and geographical breadth (@) requirements, such as freshman writing seminars, language (Swahili), expressive arts, humanities, 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 comprehensiveness 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 center's director of undergraduate studies, A. Bekerie, will review the applications and notify students within two weeks of the status of their request.

After acceptance as a major in the Africana Center, a student must maintain a C+ cumulative average in the center's courses while completing the major program. The Africana major must complete 36 credits in courses offered by the center, to include the following four core courses: AS&RC 205, 231, 290, and 422. Beyond the core courses, the student must take eight credits of center courses numbered 200 or above, and 15 credits numbered 300 or above. The program of an undergraduate major may have a specifically Afro-American focus or a specifically African focus.

Joint Majors (Minor Concentration)
The center encourages joint majors (minor concentration) in the College of Arts and Sciences and in other colleges. Joint majors are individualized programs that must be worked out between the departments concerned. The center's director of undergraduate studies, A. Bekerie, will assist students in the design and coordination of joint major programs. However, in any joint major program, the center will require that at least 16 credits be taken in Africana studies courses, including AS&RC 290.

Double Majors
In the case of double majors (as distinct from joint 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 offered as a minor concentration 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, AS&RC 191, Africa: The Continent 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 AS&RC 205, African Civilizations and Cultures or Contemporary African Development Issues. The requirements for the certificate are a minimum of 18 credit hours, including the core courses. Students interested in the certificate program must contact A. Bekerie (the center's director of undergraduate studies), who will register them in the program and assign them a faculty adviser from their own college. The faculty adviser will be responsible for determining completion of the certificate requirements.

Honors
The honors program offers students the opportunity to complete a library research thesis, a field project in conjunction with a report on the field experience, or a project or experiment designed by the student. The requirements for admission to the honors program for all students—regular majors, joint majors, and double majors—are a B+ cumulative average in all courses and a B+ cumulative average in the center's courses. Each student accepted into the honors program will have an honors faculty committee consisting of the student's adviser 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 may be used to satisfy the College of Arts and Sciences language requirement. In Swahili, successful completion of AS&RC 131, 132, 133, and 134 provides proficiency, and the addition of 202 provides proficiency. AS&RC majors are not required to take an African language, but the center recommends the study of Swahili to complete the language requirement.

AS&RC 131 Swahili
Fall. 4 credits. Language laboratory time TBA. A. Nanji.

AS&RC 132 Swahili
Spring. 4 credits. Prerequisite: AS&RC 131. A. Nanji.

AS&RC 133 Swahili
Fall. 4 credits. Prerequisites: AS&RC 131 and 132. Language laboratory time TBA. A. Nanji.

AS&RC 134 Swahili
Spring. 4 credits. Provides language qualification. Prerequisite: AS&RC 133. A. Nanji.

In this course more emphasis is placed on the development of reading ability and the acquisition of writing skills. Students are...
expected to read and comprehend selected Swahili stories and write compositions on chosen topics. Ample consideration is given to oral practice in the classroom.

AS&RC 171 Black Families and the Socioization of Black Children (III) (SBA)
Fall. 3 credits. G. Jackson.
This course provides an 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 parenthood, the extended family, and economic and health issues. The component of the course focusing on youth primarily covers child and adolescent development.

AS&RC 172 The Education of Black Americans: Historical and Contemporary Issues (III) (SBA)
Spring. 3 credits. G. Jackson.
This course is devoted to the history of educating Black Americans. Considerable attention is given to contemporary issues. The major topics of focus include an examination of the debates concerning the type of education needed, public and private schooling efforts, the Africana Studies movement, community control issues, busing, affirmative action, resegregation debates, and new initiatives in education including vouchers and charter schools.

AS&RC 191 Africa: The Continent and Its People (III) (HA)
Spring. 3 credits. L. Edmondson.
An introductory interdisciplinary course focusing on Africa’s geographical, ecological, and demographic characteristics; indigenous institutions and values; the triple cultural heritage of Africans, Islam, and Western civilization; main historical developments and transitions; and contemporary political, economic, social, and cultural change. Africa’s ties with the United States (from trans-Atlantic slavery to its impact on the emerging world order, and its contribution to world civilization are also explored.

AS&RC 202 Swahili Literature @ (IV) (LA)
Fall. 4 credits. Prerequisite: AS&RC 134. A. Nanji.
Students gain mastery over spoken Swahili and are introduced to the predominant Swahili literary forms.

AS&RC 204 History and Politics of Racialization: A Comparative Study (III)

AS&RC 205 African Cultures and Civilizations # @ (III) (CA)
Spring. Offered in summer session. 3 credits. D. Ohadike and A. Bekerie.
This course is concerned with the peoples of Africa and the development of African cultures and civilizations from the earliest times to the present day. It 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. The course 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).

AS&RC 207 Black Theatre (also THETR 207)
Spring. 3 credits. L. Grady-Willis. This performance-based course will introduce students to Black theatre through the interpretation of classic and contemporary plays. Students will read works often overlooked in mainstream theatre and literature courses, while experiencing firsthand the challenges and triumphs of black theatre together. Students will participate in individual and/or group presentations of dramatic materials. Through dialogue as well as hands-on exploration, students will gain insight into various aspects of performance and production. This course will culminate in a public performance. Students will serve as actors as well as members of the production team.

AS&RC 210 Major Works of Black World Writing (IV) (LA)
Fall. 3 credits. D. Ohadike.
This course surveys classic texts by African American, Caribbean, and African writers. The focus is on literary texts by authors such as Langston Hughes, Toni Morrison, James Baldwin, Lorraine Hansberry, Chinua Achebe, with a view toward analyzing common experiences, references, themes, and literary strategies across the Black world. The works of fiction, poetry, and drama that constitute the central material of the course are supplemented by essays and biographies from other authors who have influenced the creative vision and the movement of the peoples of Africa and the Diaspora, e.g., W. E. B. DuBois and Marcus Garvey, Nelson and Winnie Mandela.

AS&RC 220 Afro-American Social and Political Thought (III) (SBA)
Spring. 3 credits. J. Turner.
This is an introductory course that reviews and analyzes the major theoretical and ideological formulations developed and espoused by Black leaders 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 nativist-Africanism among Black people in this century. Such themes as slave resistance, nationalism, Pan-Africanism, emigration, anti-imperialism, socialism and internal colonialism, and the political and social views of Black women are discussed. Black political thought is viewed in its development as responses to concrete conditions of oppression and expression.

AS&RC 280 Race, Power, and Privilege in the United States (formerly Racism in American Society) (III) (SBA)
Spring. 3 credits. D. Barr and J. Turner.
This course is a topical treatment of the history and theory of racism in the United States. The course begins with an examination of basic concepts and theories of racism. From there we examine the history of racial groups in America—African-Americans, Native Americans, Asian Americans, and the Hispanic groups. Particular attention is paid to the political economy of racism and the sociological and psychological aspects of race relations in America, with specific reference to the differences and intersections of race, class, gender, and ethnicity.

AS&RC 283 History of Resistance Movements in Africa and the Diaspora @ (III) (HA)
Fall. 3 credits. Not offered fall 2004. D. Ohadike.

AS&RC 290 The Sociology of the African-American Experience (III) (SBA)
Fall. 3 credits. J. Turner.
This introductory course offers the student a survey of the African-American Studies. It assumes a historical-sociological approach to the examination of the African-American experience. The course presents the African beginnings of mankind and the classical role of Black people in world civilization and the making of early culture. The course treats issues in the humanities, social sciences, and history. The course is required for all undergraduate students majoring at the Africana Center.

AS&RC 301 Politics of Global Africa (also AS&RC 501) @ (III) (SBA)
Fall. 3 credits. A. Mzumi.
This course combines the study of Africa with the study of two diasporas: The Diaspora of Enslavement concerns enslaved Africans and descendants of slaves in both the western and eastern diaspora. The Diaspora of Colonization concerns demographic dispersal, and also colonialism. African and diaspora studies converge as Africans of the soil belong to the African continent but not necessarily to the Black race. Africans of the blood belong to the Black race but not necessarily to the African continent.

AS&RC 304 African American Art (also ART H 377) (IV) (LA)
Spring. 3 credits. Faculty.
This course investigates the different forms of African-American visual artistic traditions in relation to their historical and sociocultural context from the early days of slavery to the present time. The course starts with an overview of African art and the experiences of the Middle Passage and slavery in relation to African-American art traditions in the decorative arts, including pottery, architecture, ironwork, quillmaking, and basketry. This is followed by a fine art survey starting with the eighteenth and nineteenth centuries, continuing through the early twentieth-century Harlem Renaissance up to the present. Certain issues related to African-American arts and creativity such as “improvisation,” “Black Aesthetic,” and “Pan-Africanism” are also considered. Slides, films, and film strips are used extensively to illustrate topics discussed. Visits to museums and relevant current exhibitions may be arranged.

AS&RC 310 Introduction to African Art (also ART H 378) @ (IV) (LA)
Fall. 3 credits. S. Hassan.
This course is a 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 complexity 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, color, form, and sociopolitical order. New and contemporary art forms associated with major socioeconomic changes and processes of assimilation and acculturation are also explored. These include tourist art, popular art, and elite art.

[AS&RC 311 Government and Politics in Africa (III) (SBA)]
Fall. 3 credits. Not offered fall 2004. A. Mazrui.

[AS&RC 332 Twentieth-Century Black Cultural Identities @ (IV) (CA)]
Spring. 4 credits. P. Kauwuma.
This course will examine the major cultural currents of the 20th century in the Black World. Major movements/currents that will be considered include the Harlem Renaissance, Negritude, Indigenismo, Black Arts Movement, Creolité. Basing the study primarily in the reading of literary texts, the art/istic cultural movements will be studied within the historical, social, and political forces that produced them or influenced them, e.g., religion, colonialism, social protest, African and Caribbean independence, womanism. Particular attention will be given to comparisons across geographic regions, principally the African continent, North America, and the Caribbean. The reading of the literary texts will be supported by theoretical readings as well as references to other artistic forms, such as visual arts and music.

[AS&RC 352 Pan-Africanism and Internal Assimilation Politics (III) (SBA)]
Spring. 3 credits. Not offered spring 2005. L. Edmondson.

[AS&RC 362 Global Perspectives on Gender @ (III)]

[AS&RC 380 African History: Earliest Times to 1800 @ (III) (HA)]
Fall. 3 credits. Not offered fall 2004. A. Bekerie.

[AS&RC 381 African History, 1800- Present @ (III) (HA)]

[AS&RC 390 African American Cinema (also AM ST 386, ART H 390, and FILM 390) (IV) (LA)]
Fall. 4 credits. Faculty. This seminar looks at the history of African American filmmaking from the perspective of directors, actors, studios, and audiences. We study the works of pioneering Black filmmakers from Oscar Micheaux to Julie Dash. Other topics include Race Cinema, "blaxploitation" films, the New Black Cinema, Black women's filmmaking, and documentaries. Readings in film studies and critical race theory direct our analyses of the films. Weekly screenings in addition to regular readings that prompt. Mandatory Wednesday evening film screenings.

[AS&RC 404 Afrocentricity: Paradigm and Critical Readings @ (III) (CA)]
Fall. 4 credits. Not offered fall 2004. A. Bekerie.

[AS&RC 410 African American Politics (III) (HA)]

[AS&RC 420 Public Policy and the African-American Urban Community (III) (SBA)]
Spring. 4 credits. J. Turner.
The socioeconomic conditions of the African-American community are the central focus of the course. Community development models are explored in relationship to the social needs of the African-American population. The changing configuration of internal organization of the African American community nationally is examined.

[AS&RC 422 African Literature @ (IV) (LA)]
Spring. 4 credits. Not offered spring 2005. A. Adams.

[AS&RC 435 African Cinema (also ART H 470 and S HUM 435) @ (IV) (LA)]
Fall. 4 credits. Not offered fall 2004. S. Hassan.

[AS&RC 451 Politics and Social Change in the Caribbean (III) (SBA)]
Fall. 4 credits. Not offered fall 2004. L. Edmondson.

[AS&RC 455 Caribbean Literature @ (IV) (LA)]
Fall. 4 credits. Not offered fall 2004. A. Adams.

[AS&RC 459 Education in Africa and the Diaspora (III) (SBA)]
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 on the concepts of education and innovations, and the states 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, U'mazwa and education for self-reliance in Tanzania, and the case of Eto'o Ivoire, which adopted television as a medium of instruction.

[AS&RC 463 Islam in Global Africa (III) (CA)]
Fall. 4 credits. Not offered fall 2004. A. Mazrui.

[AS&RC 466-469 Honors Thesis]
468, fall; 469, spring. 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. Permission of the AS&RC director of undergraduate studies is required.

[AS&RC 475 Black Leaders and Movements in African-American History (III) (HA)]
Fall. 4 credits. R. Morris.
The course analyzes the personalities, ideas, and activities central to the struggle for African-American liberty from the eighteenth century to the present. It examines theories of leadership and the structure of protest movements with the goal of understanding current leadership needs and trends among African Americans.

[AS&RC 478 The Family and Society in Africa (III) (SBA)]
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 concept of the nuclear and extended family; the roles, rights, and obligations of age groups and generations; and marriage and its related issues, including parenthood, childrearing, and gender roles. Other issues examined: family 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 westernization, urbanization, 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.

[AS&RC 479 Women and Gender Issues in Africa (III) (SBA)]
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. Among the topics covered: women in non-westernized/pre-colonial societies, the impact of colonial policies on the status of women, gender and access to schooling, participation in the economy and politics; women and the law; women and health issues; gender issues in southern Africa; womanism and feminism; the United Nations Decade and the four World Conferences on Women (Mexico 1975, Copenhagen 1986, Nairobi 1985, and Beijing 1995).

[AS&RC 483 History of African Political Thought @ # (III)]

[AS&RC 484 Politics and Social Change in Southern Africa (III) (SBA)]
Spring. 4 credits. L. Edmondson.
This course focuses on the legacies of apartheid and the challenges of transformation toward a post-apartheid society in Southern Africa. Topical emphases include the rise and decline of apartheid; the historical continuity of Black resistance against racism; women under, against, and after apartheid; South Africa's relations with its neighbors; geopolitical, economic, and racial dimensions of the African connection; politics of negotiation and transition to majority rule; prospects for stability, democracy, and equality; and South Africa's new role in the African continental and global arenas. Instructor's lectures are supplemented by films and class discussions.
AS&RC 490 Nile Valley Civilization: Ethiopia, Nubia, and Egypt (IV) (HA)
Spring. 4 credits. A. Bokharee.
This course focuses on "Nile Valley" civilizations and their contributions to African and world history. Since natural and human resources provide the foundation for civilizations, the course also examines the ecological and cultural compositions of the river. We concentrate on the Aksumite civilization of Ethiopia, Nubian civilizations of the Sudan, and the Kemetic civilizations of Egypt. We use archaeological, literary, oral, biological, and religious sources to study civilization centers along the Nile. We discuss civilizations as artifacts that have material, spiritual, social, and philosophical dimensions. Students are introduced to the Ethiopic writing system as a practical lesson in the conception and understanding of aspects of African civilizations.

AS&RC 498-499 Independent Study
498, fall. 499, spring. Africana Center faculty.
For students working on special topics, with selected reading, research projects, etc., under the supervision of the Africana Studies and Research Center faculty.

AS&RC 501 Global Africa: Comparative Black Experience
Fall. 4 credits. Cross-listed with AS&RC 301. A. Mazzu.
This seminar addresses two diasporas in the Black experience. The diaspora of enslavement concerns slaves and descendants of slaves in both the Western and Eastern Diaspora. The diaspora of colonization concerns demographic dispersal as a result of colonialism. The majority of African-Americans are part of the Diaspora of Enslavement. Recent Algerian immigrants into France are part of the Diaspora of Colonization. Jamaicans and Trinidadians in Britain are part of a double diaspora—products of both enslavement and colonialism. The course addresses these areas of Black comparison. Comparative Slavery—A Triple Heritage: Race and Race Mixture in Four Traditions; Comparative Emancipation from Slavery and from Colonization; Comparative Struggle for Civil Rights; The Gender Question in Global Africa; and Comparative Quest for Global Equality.

AS&RC 502 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 industrialized countries, including African countries, education has also been perceived as a hindrance to development. The concept of human capital and paradigms of development including modernization, dependency, and Third World Forum are first introduced. Specific issues discussed include schooling and nonformal education; the role of primary, secondary, and higher education in development, and language, access, output, and outcome based on social class, ethnicity, race, and gender. Employment, migration and international brain drain, the information and communication technologies, indigenous knowledge systems, and the role of higher education in regional and international cooperation are also examined.

AS&RC 503 African Aesthetics (also ART H 571)
Fall. 4 credits. Not offered fall 2004. S. Hassan.

AS&RC 504 Political Change in Africa
Fall. 4 credits. Not offered fall 2004. A. Mazrui.

AS&RC 505 Contemporary African Diaspora Art (also ART H 506)
Fall. 4 credits. Faculty. 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 identity, race, 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 focus on artists working after 1960, but also study their roots in the twentieth century and earlier.

AS&RC 510 Historiography and Sources: The Development of African-American History
Spring. 4 credits. Prerequisite: upperclass graduate standing or permission of instructor. Not offered spring 2005. R. Harris.

AS&RC 530 Womanist Writing in Africa and the Caribbean
Spring. 4 credits. Not offered spring 2005. A. Adams.

AS&RC 532 Twentieth-Century Black Cultural Movements
Spring. 4 credits. P. Kauourma.
This course will examine the major cultural currents of the 20th century in the Black World. Major movements/currents that will be considered include the Harlem Renaissance, Negritude, Indigenismo, Black Arts Movement, Creole. Basing the study primarily in the reading of literary texts, the artistic/cultural movements will be studied within the historical, social, and political forces that produced or influenced them, e.g., religion, colonialism, social protest, African and Caribbean, womanism. Particular attention will be given to comparisons across geographic regions, principally the African continent, North America, and the Caribbean. The reading of the literary texts will be supported by theoretical readings as well as references to other artistic forms, such as visual arts and music.

AS&RC 598-599 Independent Study
598, fall; 599, spring. Variable credit. For graduate students.

AS&RC 601-602 Africana Studies Graduate Seminar
601, fall; 602, spring. 4 credits. Africana Studies faculty.
This course, which is conducted as a seminar, is designed for first-year AS&RC graduate students. It is coordinated and supervised by one professor but team-taught by three or four faculty members. Each participating faculty member is responsible for a topical segment of the course related to her/his areas of specialization or an area of interest pertaining to theory and methodology of Africana Studies.

AS&RC 698-699 Thesis
698, fall; 699, spring. Limited to Africana Studies and Research Center graduate students.

AKKADIAN
See Department of Near Eastern Studies.

AMERICAN STUDIES

The Major
American Studies majors, appropriate for a wide array of future professions, began as a program of coordinated study in the history, literature, and politics of the United States. These remain the core elements, but American Studies aims to be inclusive of its subject matter. Given the nation's diverse population and cultures, the program wants its majors to examine American experience in broad terms, drawing on the materials and methods of a variety of disciplines.

Students who contemplate becoming an American Studies major are encouraged to speak with the program director as early as possible to arrange for a major advisor.

In consultation with their advisers, American Studies majors elect, in addition to the prerequisites, nine courses above the 100 level chosen from the American Studies course list (these courses are usually crosslisted with another department). Their work must include courses in all of the three large periods into which the nation's development can be divided (colonial, nineteenth century, and twentieth century). Students must take no fewer than four courses before 1900. At least one of these courses must be in the period before 1800. Each student must also take one of AM ST 430 seminars or an appropriate substitute seminar at the 400 level. (AM ST 400F, taught in Washington, D.C., does not fulfill the seminar requirement.) Students are given considerable freedom in creating a balanced program, but no more than five courses may be in any one department.
Beyond the basic core requirements for the major, two courses of work in the history or literature of a culture outside the United States are required. Students who study abroad for one semester usually satisfy this requirement.

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 adviser'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 Program faculty and discuss their ideas for a project. With approval from the faculty, students may then register in the fall of their senior year for AM ST 493, the honors essay tutorial. At the end of the fall semester, honors candidates will meet with their adviser and a second member of the American Studies faculty to discuss their progress. If satisfactory, honors students will complete their honors essays in the spring by enrolling in AM ST 494.

Prerequisite Courses (see also under appropriate departments)

[AM ST 101 Introduction to American Studies: History and Literature, the Nineteenth Century (LA)]
G. C. Aalschuler and D. McCull.
This interdisciplinary course analyzes American values and behavior as the intersection of culture, politics, literature, and society by examining eight "great" classic texts written between 1776 and 1900. The historical context of these texts is explored in lectures, and they are treated as literature and historical/cultural documents. Texts include Common Sense by Thomas Paine; The Scarlet Letter by Nathaniel Hawthorne; The Lincoln-Douglas Debates; Henry James, The Bostonians; Mark Twain's Huckleberry Finn; and William Dean Howells' The Rise of Silas Lapham.

[AM ST 102 Introduction to American Studies: History and Literature, the Twentieth Century (III) (LA)]
G. Aalschuler and D. McCull.
In this interdisciplinary course we analyze American values and behavior as the intersection of culture, politics, literature, and society. We do so by examining eight "great" or classic texts written between 1900 and the present. Texts include Joseph Wood Krutch, The Modern Temper; Hemingway, A Farewell to Arms; Fitzgerald, The Great Gatsby; Reinhold Niebuhr, Children of Light, Children of Darkness; Faulkner, The Sound and the Fury; Ellison, Invisible Man; Roth, American Pastoral; and Updike, Rabbit Is Rich.

[AM ST 109 Introduction to American Studies: New Approaches to Understanding American Diversity, the Nineteenth Century # (III) (HA)]
N. Salvatore.
This course examines the first-century-and-one-half of American national life and asks a series of interrelated questions about the changing meaning of national identity during this time. What did it mean to become an American, a process often urged on new immigrants, in light of the values and perceptions immigrants brought with them? What did democracy, a core element of becoming that American, mean if one were African or Native American? Irish or German? Jewish or Chinese? In what ways did racial and ethnic perceptions help structure political and cultural life during this period? And how does understanding the diverse historical reactions to these perceptions aid us in understanding the complexity of American life? This is an interdisciplinary course in which students analyze historical, literary, and cultural evidence in exploring these and other issues.

AM ST 110 Introduction to American Studies: New Approaches to Understanding American Diversity, the Twentieth Century (also HIST 161, LSP 110, AES 111) (III or IV) (HA)
Fall. 4 credits. M. C. Garcia and D. Chang.
This course examines American national life in the twentieth century and asks questions about the changing meaning of national identity. What does it mean to be an American in the twentieth century? What does it mean to assimilate: can one assimilate structurally and yet maintain a distinct cultural identity? In what ways do racial and ethnic perceptions structure political, economic, and cultural life? This is an interdisciplinary course in which students analyze historical, literary, and cultural evidence in exploring these and other issues.

American Studies 430 Seminars

AM ST 430.2 America in the Camera's Eye (also HIST 430, ART H 430) Spring. 4 credits. Prerequisite: permission of instructor. R. L. Moore.
Photographs and films have become archives for historical research in the era of Matthew Brady's Civil War images, the United States has been recorded by documentary photographers who have called attention to the country's progress and its poverty. Hollywood filmmakers also have recorded endless images of American landscape and placed against that landscape fictionalized accounts of the country's history and its social problems. What can we learn from these images? What is their relation to written texts and to other documents that tell us about the past? How truthful is documentary? How misleading is Hollywood? One key text will be James Agee's and Walker Evans' Let Us Now Praise Famous Men. The seminar will meet once each week for discussion and periodically during the semester to view films.

AM ST 430.3 Americans at Play: World's Fairs, Amusement Parks, Movie Theaters (also VISST 430)
Fall. 4 credits. Prerequisite: permission of instructor required.
The late nineteenth century saw an explosion of new leisure practices—from world's fairs to amusement parks, museums, vaudeville and movie theaters—that led to what historians have called the "twentieth-century entertainment revolution." Suddenly, Americans seemed to be defined by how they played rather than how they worked; leisure practices assumed a crucial function in U.S. self-definition. In this course, we explore the cultural functions of leisure spaces. What are the connections between play and work, play and everyday life? How are leisure spaces connected to utopian traditions? How do they reproduce and allow us to negotiate the traumatic experiences of modern life? How do they reflect and intervene in U.S. cultural politics? How are they contested and regulated? We begin with the ways in which nineteenth- and early-twentieth-century world's fairs—such as the 1893 Columbian Exposition and 1915 Panama-Pacific International Exposition—collected and displayed cultures(s), establishing the contradictory impulses of U.S. entertainment and (self) display; case studies include Coney Island and Disneyworld, Picture Palaces, drive-ins, and mall theaters. Students are encouraged to develop a project on a leisure space of their choice. The course is interdisciplinary: we read cultural history, fiction, and cultural and social theory; and we look at photographs and watch several films.

AM ST 430.5 The Milman Seminar (also HIST 448) Spring. 4 credits. Prerequisite: permission of instructor. M. Washington.
The Milman Seminar in American Studies explores the role of diversity in the formation of a distinct American tapestry. The specific topic varies each year, but the general subject is the promise and experience of pluralism. Topic for spring 2005: Diversity and Civil Disobedience. This seminar focuses on specific issues and historical moments in which citizens challenged discriminatory governmental policies and societal customs. Most of the material covered relates to American history (the abolitionists, Thoreau, Bishop Gilbert Hovey, Susan B. Anthony, the Black Panthers, and the Peace and Freedom Party), but material is also drawn from protest movements in South Africa and India (Mandela and Gandhi).

G. C. Aalschuler.
The Milman Seminar: Baseball in American Culture. Through a reading of fiction and nonfiction, we examine the role of baseball as it has shaped and reflected the attitudes and values of Americans. Novels assigned in the course include Bernard Malamud, The Natural; Mark Harris, Bang the Drums Slowly; Philip Roth, The Great American Novel; and Robert Coover, The Universal Baseball Association. Nonfiction works include Warren Goldstein, Playing for Keeps; Robert Peterson, Only the Ball Was White; and Andrew Zimbalist, Baseball and Billions. Each student in the course writes a 25– to 35-page research paper.

Anthropology, Sociology, and Economics

AM ST 221 Anthropological Representation: Ethnographies of Latino Culture (also ANTHR 221 and LSP 221)
Fall. 3 credits. V. Santiago-Irazurry. For description, see ANTHRO 221.

[AM ST 377 The United States (also ANTHR 377 and LSP 377)]
V. Santiago-Irazurry. For description, see ANTHRO 377.]
ARTS AND SCIENCES - 2004-2005

AM ST 206 Introduction to American Literature (also ENGL 203)
4 credits. E. Cheyfitz.
For description, see ENGL 203.

AM ST 207 Introduction to American Literature (also ENGL 204)
Spring. 4 credits. J. Carlando.
For description, see ENGL 204.

AM ST 215 Comparative American Literature (also COM L 215)
Spring. 4 credits. B. Maxwell.
For description, see COM L 215.

AM ST 219 Introduction to Narrative: LA Close Up (also ENGL 206)
For description, see ENGL 206.

AM ST 220 Film Style and the Cinema Experience (also FILM 202)

AM ST 230 Survey of American Film (also FILM 276) (IV) (LA)

AM ST 240 Survey in U.S. Latino Literature (also ENGL 240, LSP 240)
For description, see ENGL 240.

AM ST 252 Twentieth-Century Women Writers (also ENGL 251, FGSS 251)
Spring. 4 credits. K. McCullough.
For description, see ENGL 251.

AM ST 253 Late Twentieth-Century Women Writers and Visual Culture (also FGSS 252, VISST 252)
Spring. 4 credits. S. Samuels.
For description, see ENGL 252.

AM ST 260 Introduction to American Indian Literature (also ENGL 260)
For description, see ENGL 260.

AM ST 262 Asian American Literature (also ENGL 262, AAS 262)
For description, see ENGL 262.

AM ST 268 The Culture of the 1960s (also ENGL 268)
Spring. 4 credits. P. Sawyer.
For many people, the sixties was a time of revolutionary hopefulness. When the civil rights movement, the Cold War, and the Vietnam War stimulated impassioned critiques and alternative experiments in living that changed American society forever. What can the experiences of young “boomers” and others who lived through that famously turbulent decade teach us about our current society? How can we learn from the political, social, cultural, and environmental issues in 1960s America? And what can we learn about contemporary America? We will focus on the ways film shapes gender, race, class, and nation; but the course will also explore the ways in which films shape race, gender, and nation.

AM ST 275 The American Literary Tradition (also ENGL 275)

The problem of an American national literature is explored through the reading, discussion, and close analysis of texts across the range of American literary history. Not a survey, this course focuses on the relations of the texts to each other, the shaping of national identities in those relationships, and the assumptions about history, language, and the self that underlie them.

AM ST 293 Survey in African American Literature (also ENGL 293)
For description, see ENGL 293.

AM ST 318 Queer Theatre (also THETR 320)
For description, see THETR 320.

AM ST 334 American Drama and Theatre (also THETR 336 and ENGL 336)
For description, see THETR 336.

AM ST 335 Contemporary American Theatre (also THETR 337 and ENGL 337)
For description, see THETR 337.

AM ST 338 American Film Melodrama (also FILM 344, ENGL 344)
Spring. 4 credits. S. Haenni.
For description, see FILM 344.

AM ST 346 Film Noir (also FILM 346) (IV) (LA)

At the close of World War II, the French coined the term “film noir” to describe a new, “dark,” and “gloomy” set of Hollywood films that were populated by feminine fatales, criminal gangs, private eyes, and lovers on the run, and that centered on issues of violence, crime, paranoia, betrayal, pessimism, and self-doubt. Deriving from hard-boiled detective fiction, and influenced by German expressionist cinema, film noir has now become one of the most acclaimed genres in Hollywood film. In this course, we explore both the stylistic characteristics and thematic and cultural contexts of film noir. We examine the history and function of “noir” as a critical term, the influence of hard-boiled fiction, and the evolution of noir style and noir narratives. We investigate how film noir articulates anxieties about postwar masculinity and about the sexual and social roles of women; how it popularizes psychology; how it portrays the city as an “urban jungle”; and how it represents a response to fears about communism and the atomic bomb. Screenings include major studio features such as Double Indemnity and Laura, B-pictures such as Detour and Gun Crazy, and “neo-noirs” such as Chinatown and Devil in a Blue Dress. Our discussion of films will be guided by readings in film criticism and history.

AM ST 361 Studies in the Formation of U.S. Literature: Emerson to Melville (also ENGL 361)
Spring. 4 credits. D. Fried.
For description, see ENGL 361.

AM ST 362 The American Renaissance (also ENGL 362)
For description, see ENGL 362.

AM ST 363 American Fiction at the Turn of the Century (also ENGL 363)
For description, see ENGL 363.

AM ST 365 American Literature Since 1945 (also ENGL 365)
For description, see ENGL 365.

AM ST 366 Studies in U.S. Fiction before 1900: The Nineteenth-Century American Novel (also ENGL 366)
Spring. 4 credits. S. Samuels.
For description, see ENGL 366.

AM ST 367 Studies in U.S. Fiction After 1900 (also ENGL 367)
Fall. 4 credits. E. Cheyfitz.
For description, see ENGL 367.
[AM ST 368] The American Novel Since 1950 (also ENGL 368)

[AM ST 370] Survey in African American Literature: 1918 to Present (also ENGL 370)

[AM ST 372] American Poetry Since 1950 (also ENGL 372)

[AM ST 374] Slavery in Twentieth Century American Film and Fiction (also ENGL 374 and FGSS 378)

[AM ST 386] African American Cinema (also AS&RC 390, ART H 390, FILM 390)
Fall. 4 credits. Staff. For description, see AS&RC 390.

[AM ST 393] International Film of the 1970s (also FILM 393)
4 credits. Not offered 2004–2005. S. Haenni. More than being characterized by a retreat from political, critical cinema and by the reemergence of the Hollywood blockbuster such as The Godfather, Star Wars, and Jaws, the seventies were also a period of enormous 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. In this course, we focus on the transnational nature of seventies film; the influence of European art cinema on American film; the reworking and rejuvenation of genre films (neo-noir, western, horror film, road movie, etc.). European responses to and appropriation of American film genres, film conventions, and subject matter; Asian influence in the United States on not only the martial arts film, but the emergence of film subcultures, such as black independent film and blaxploitation. Screenings include works by Arthur Penn, Bob Altman, Francis Ford Coppola, Steven Spielberg, Charles Burnett, John Cassavetes, Mario Van Peebles, Gordon Parks, Milos Forman, Sergio Leone, Michelangelo Antonioni, Lina Wertmuller, Bertrand Blier, Louis Malle, Eric Rohmer, Chantal Akerman, Rainer Werner Fassbinder, Wim Wenders, Nicholas Roeg, and Stanley Kubrick and are guided by readings in film criticism and film history.

[AM ST 395] Policing and Prisons in American Culture (also ENGL 397)
Spring. 4 credits. B. Maxwell. For description, see ENGL 397.

[AM ST 396] Latina/o Cultural Practices (also ENGL 398, LSP 398)

[AM ST 403] Studies in American Poetry: A. R. Ammons (also ENGL 403)

[AM ST 452] Sonority Seminar in Latin American and Caribbean Feminism (also ENGL 462, LSP 462)
Spring. 4 credits. M. P. Brady. For description, see LSP 462.

[AM ST 465] American Violence (also ENGL 465)
Fall. 4 credits. S. Samuels. For description, see ENGL 465.

[AM ST 468] Intersections in Lesbian Fiction (also ENGL 476, FGSS 477)
Spring. 4 credits. K. McCullough. For description, see ENGL 478.

[AM ST 469] William Faulkner (also ENGL 469)

[AM ST 473] American Indian Autobiography (also ENGL 473)

[AM ST 475] Seminar in Cinema I (also FILM 475)

[AM ST 476] American Melodrama and Film (also FILM 476)

[AM ST 477] Melville (also ENGL 477)
Fall. 4 credits. B. Maxwell. For description, see ENGL 477.

[AM ST 479] Jewish-American Writing (also ENGL 479 and JWST 478)

Government and Public Policy

GOVT 111 Introduction to American Government and Politics
Fall. 3 credits. J. S. Jones. An introduction to government through the American experience. Concentration on analysis of the institutions of government and politics as mechanisms of social control.

GOVT 302 Social Movement in American Politics (also GOVT 302)

GOVT 310 Civil Liberties in the United States (also GOVT 327)

GOVT 311 Urban Politics (also GOVT 311)
Spring. 4 credits. M. Shefter. For description, see GOVT 311.

GOVT 313 Racial and Ethnic Politics (also GOVT 319)
Spring. 4 credits. M. Jones-Correa. For description, see GOVT 313.

GOVT 315 Prisons (also GOVT 314)

GOVT 316 The American Presidency (also GOVT 316)
Fall. 4 credits. M. E. Sanders. For description, see GOVT 316.

GOVT 319 The U.S. Congress (also GOVT 319)
Fall. 4 credits. M. Shefter. For description, see GOVT 319.

GOVT 326 Imagining America: Race and National Fantasy in European Travel Writing from De Tocqueville to Baudrillard (also COM L 341, GOVT 303) (III or IV) (CA)
Fall. 4 credits. D. Rubinstein. This course addresses nineteenth- and twentieth-century European travel writing about America from Alexis de Tocqueville’s landmark work, Democracy in America, to Jean Baudrillard’s polemical America and Umberto Eco’s Travels in Hyperreality. We will be concerned with the question of what America, as both "utopian" ideal and as a living example, represents for the European philosophical voyager. For example, what role does national fantasy play in the encounters revealed in Julia Kristeva’s excursion to American universities in The Samourai or in Simone de Beauvoir’s guided (by Richard Wright) tour as recounted in her diary America Day by Day? We will also discuss Francois-René de Chateaubriand’s Renée and Atalais as a literary limit case of intercultural exchange. We will also consider how race is implicated in these writings (e.g., de Tocqueville, de Beauvoir, Kristeva’s consideration of “the foreigner”) and the pertinence of American genres such as the captivity narrative for readings of Chateaubriand or de Tocqueville and Beauvoir’s writings on prison.

GOVT 328 Constitutional Politics: The United States Supreme Court (also GOVT 328)

GOVT 350 Atomic Consequences: The Incorporation of Nuclear Weapons in Postwar America (also S&TS 350, GOVT 305)
4 credits. For description, see S&TS 350.

GOVT 353 Feminism Movements and the State (also GOVT 353, FGSS 353)

GOVT 376 American Political Thought from Madison to Malcolm X (also GOVT 366 and HIST 316)

GOVT 392 Science in the American Polity, 1800-1960 (also S&TS 390, GOVT 308)
[AM ST 389] Science in the American Polity, 1960–Now (also S&T 391, GOVT 309)
For description, see S&T 391.

[AM ST 404] American Political Development in the Twentieth Century (also GOVT 404)
Fall. 4 credits. M. E. Sanders.
For description, see GOVT 404.

[AM ST 422] War at Home (also GOVT 420)
Fall. 4 credits. M. Shafter and J. Rabkin.
For description, see GOVT 420.

[AM ST 424] Contemporary American Politics (also GOVT 424)
Spring. 4 credits. M. Shafter.
For description, see GOVT 424.

[AM ST 428] Government and Public Policy: An Introduction to Analysis and Criticism (also GOVT 428)
For description, see GOVT 428.

[AM ST 429] Government and Public Policy: An Introduction to Analysis and Criticism (also GOVT 429)
For description, see GOVT 429.

[AM ST 501] Politics and Policy: Theory, Research, and Practice (also GOVT 500, ALS 500, PAM 406)
Fall and spring. 8 credits each term.
S. Jackson.
Offered in the 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.

History
[AM ST 103] Introduction to American History (also HIST 153)
Fall. 4 credits. E. Baptist.
A survey of American history from the beginning through the Civil War. Topics include cultural encounters in the age of Columbus, European colonization, the American Revolution, the early republic, antebellum reform movements, and the coming of the Civil War.

[AM ST 104] Introduction to American History (also HIST 154)
Spring. 4 credits. M. C. Garcia.
An introductory survey of the development of the United States since the Civil War.

[AM ST 124] Democracy and Its Discontents: Political Traditions in the United States (also HIST 124)
Summer. 3 credits. N. Salvatore.
An examination of democracy and its critics. The course explores the evolution of democracy in America, focusing on some of the dramatic and important episodes in American history. It considers the struggles over the emancipation of slaves in the nineteenth century and the expanded rights for women and working people in the twentieth 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 introduction of the ways in which political expression takes forms in modern American culture. In addition to lectures, the course features several afternoon programs. These programs include guest lecturers and hands-on instruction in how to use the modern electronic research library.

[AM ST 158] Introduction to Native American History (also HIST 158)
J. Parmenter.
For description, see HIST 158.

[AM ST 201] Popular Culture in the United States, 1900–1945 (HA)
Fall. 4 credits. G. Altschuler.
AM ST 201 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, we try 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 for 201 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.

[AM ST 202] Popular Culture in the United States, 1945–Present (HA)
Spring. 4 credits. G. Altschuler.
AM ST 202 treats the period from 1945 to the present. As we examine best-sellers, films, sports and television, radio, ads, newspapers, magazines, and music, we try to better understand the ways in which popular culture shapes and/or reflects American values. The course also explores popular culture as "contested terrain," the place where social classes, racial and ethnic groups, women, and men, the powerful and less powerful, seek to "control" images and themes. Topics for 202 include: The Honeymooners and 1950s television; soap operas; "Gloss-out" movies; Elvis; the Beatles; and Guns 'n Roses; Gothic Romances; and People Magazine and USA Today.

[AM ST 204] Comparative Migration in the Americas (also HIST 202)
M. C. Garcia.
For description, see HIST 202.

[AM ST 208] Seminar: Era-Franklin D. Roosevelt (also HIST 208)
R. Polenberg.
For description, see HIST 208.

[AM ST 209] Seminar in Early America (also HIST 209)
M. B. Norton.
For description, see HIST 209.

[AM ST 210] The Emergence of Modern Conservative Movement: From Strom Thurmond to Ronald Reagan
Fall. 4 credits. Limited to 15 students. Preference given to sophomores.
N. Salvatore.
This course explores the social and cultural roots of modern American conservatism and its rise to political prominence in the post-1945 era. We examine the movement's intellectual origins, social and cultural attitudes, and the political figures who presented conservatism's analysis to the public. The interplay between this revived political movement and a more liberal approach deeply grounded in the New Deal and its legacy receives attention as well.

[AM ST 212] African American Women: Twentieth Century (also HIST 212 and FGSS 212)
For description, see HIST 212.

[AM ST 213] Introduction to Asian American History (also HIST 264 and AAS 213)
Fall. 4 credits. D. Chang.
For description, see HIST 264.

[AM ST 214] Seminar on American Foreign Policy (also HIST 214)
For description, see HIST 214.

[AM ST 218] Road Trip in American History and Culture (also HIST 220)
Fall. 4 credits. A. Sachs.
For description, see HIST 220.

[AM ST 225] The U.S.-Mexico Border: History, Culture, Representation (also HIST 225 and LSP 225)
M. C. Garcia and R. Craib.
For description, see HIST 225.

[AM ST 229] Jefferson and Lincoln (also HIST 229)
Spring. 4 credits. Limited to 15 students. Preference given to underclassmen.
E. Baptist.
For description, see HIST 229.

[AM ST 236] Native People of the Northeast, Pre-Contact to the Present (also HIST 236, AIS 236)
Fall. 4 credits. J. Parmenter.
For description, see HIST 236.

[AM ST 239] Immigration and Ethnicity in Twentieth-Century United States (also HIST 240, LSP 241)
Fall. 4 credits. M. C. Garcia.
For description, see HIST 240.

[AM ST 241] History of Childhood in the United States (also HD 241 and HIST 271)
Fall. 4 credits. J. Parmenter.
For description, see HD 241.

[AM ST 242] Religion and Politics in American History from J. Winthrop to R. Reed (also HIST 242 and RELST 242)
Fall. 4 credits. Prerequisite: permission of instructor. R. L. Moore.
For description, see HIST 242.

[AM ST 251] Black Religious Traditions from Slavery to Freedom (also HIST 251 and RELST 251)
Fall. 4 credits. M. Washington.
For description, see HIST 251.

[AM ST 255] Historical Development of Women as Professionals, 1800 to Present (also HD 258, HIST 278, FGSS 238)
J. Brumberg.
For description, see HD 258.
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 viewpoints are guided by readings in film and urban theory and history.


AM ST 265 Introduction to Native American History (also HIST 266, AIS 266) Spring. 4 credits. J. Parmenter. For description, see HIST 266.

AM ST 272 The Atlantic World from Conquest to Revolution (also HIST 272) Spring. 4 credits. M. B. Norton and R. Weil. For description, see HIST 272.


AM ST 292 Inventing an Information Society (ECCE 298, ENGRG 298, HIST 292, S&TS 292) Spring. 3 credits. R. Kline. For description, see ECCE 298.


AM ST 304 American Culture and Social Change, 1880–1980 (also HIST 304) Fall. 4 credits. M. Kammen. For description, see HIST 304.


AM ST 309 The Cinema and the American City (also FILM 342) Spring. 4 credits. S. Haeni. The emergence of the cinema in the late nineteenth 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 viewpoints are guided by readings in film and urban theory and history.

AM ST 314 The British-French North America (also HIST 314) Fall. 4 credits. J. Parmenter. For description, see HIST 314.

AM ST 317 American Constitutional Development (also HIST 318) Spring. 4 credits. R. Polenberg. For description, see HIST 318.

AM ST 320 Understanding Work in America, 1800–1990 (also HIST 315) 4 credits. Not offered 2004–2005. N. Salvatore. This course examines both the experience and the perception of work in American life in the century framed by two fundamental formations: the emergence of a system of industrial capitalism largely nationalistic in its orientation and the development of a more international economic system in more recent times. Among the topics considered are the effects of technological change, its impact on the experience of work across numerous occupational categories, and the changing perceptions of work as reflected in contemporary cultural expression, literature, and commentary across the century.


AM ST 324 Varieties of American Dissent, 1880–1990 (also HIST 324) 4 credits. Not offered 2004–2005. N. Salvatore. The idea of dissent in American society raises a variety of images. Civil rights activists, striking workers, and student radicals of the 1960s are familiar enough symbols of dissent. But might we understand a Pentecostal believer, filled with the spirit of his or her God in critiquing contemporary society, as an example of American dissent? This course explores the varieties of economic, political, and cultural dissent in American between 1880 and 1990, and examines how understanding dissent in its specific historical context illuminates major aspects of American life and culture.


AM ST 332 The Urbanization of American Society, 1800 to 1860 (also HIST 332) Fall. 4 credits. S. Blumin. For description, see HIST 332.

AM ST 333 The Urbanization of American Society, 1860–2000 (also HIST 333) Spring. 4 credits. S. Blumin. For description, see HIST 333.


AM ST 340 Recent American History, 1925–1960 (also HIST 340) Fall. 4 credits. R. Polenberg. For description, see HIST 340.


AM ST 346 Modernization of the American Mind (also HIST 346) Spring. 4 credits. R. L. Moore. For description, see HIST 346.

AM ST 349 Environmental History: The United States and the World Culture (also HIST 315) Spring. 4 credits. A. Sachs. For description, see HIST 315.

AM ST 356 Engineering in American Culture (also ENGRG 357, HIST 357, S&TS 357) Fall. 4 credits. R. Kline. For description, see ENGRG 357.

AM ST 357 Latinos, Law, and Identity (also LSP 355, D SOC 355) Spring. 3 credits. R. Mize. For description, see LSP 355.


AM ST 375 Comparative U.S. Racial and Ethnic Relations (also LSP 375, DSOC 375) Fall. 3 credits. R. Mize. For description, see LSP 375.
AM ST 378 | Topics in U.S. Women's History (also HIST 378 and FGSS 378)
For description, see HIST 378.

AM ST 411 | Undergraduate Seminar in the History of the American South: Race and Sex, Men and Women; Gender of the Old South (also HIST 411)
For description, see HIST 411.

AM ST 417 | History of Female Adolescence (also HD 417, HIST 458, FGSS 438)
Spring. 4 credits. Prerequisite: permission of instructor. J. Brumberg.
For description, see HD 417.

AM ST 419 | Seminar in American Social History (also HIST 419)
Spring. 4 credits. Taught in Washington, D.C. S. Blumin.
For description, see HIST 419.

AM ST 420 | Asian American Communities (also HIST 420, AAS 424)
For description, see HIST 420.

AM ST 421 | Undergraduate Seminar in American Cultural History (also HIST 421, ART H 421)
Fall. 4 credits. Prerequisite: permission of instructor. M. Kammen.
For description, see HIST 421.

AM ST 426 | The West and Beyond: Frontiers and Borders in American History and Culture (also HIST 426)
Spring. 4 credits. A. Sachs.
For description, see HIST 426.

AM ST 439 | Reconstruction and the New South (also HIST 439)
For description, see HIST 439.

AM ST 440 | Undergraduate Seminar in Recent American History (also HIST 440)
For description, see HIST 440.

AM ST 444 | American Men (also HIST 444)
Fall. 4 credits. E. Baptiste.
For description, see HIST 444.

AM ST 455 | Bad Boys (also HD 455, FGSS 465, and HIST 465)
For description, see HIST 455.

AM ST 466 | Iroquois History (also HIST 466)
For description, see HIST 466.

AM ST 499 | New World Encounters, 1500–1800 (also HIST 499)
For description, see HIST 499.

AM ST 500 | Research Seminar in American Studies (also HIST 500)
Fall or spring. Offered in Cornell in Washington Program only. S. Blumin and others.
For description, see HIST 500.

AM ST 501 | Politics and Policy: Theory, Research, and Practice (also GOVT 500, ALS 500, and PAM 406)
Fall, spring. Offered in Cornell in Washington Program only. S. Jackson.
For description, see GOVT 500.

Music and Visual Studies

AM ST 105 | Popular Music in America: 1850–1985 (also MUSIC 101)
For description, see MUSIC 101.

AM ST 222 | A Survey of Jazz (also MUSIC 222)
Fall. 3 credits. S. Pond.
For description, see MUSIC 222.

AM ST 223 | History of Rock Music (also MUSIC 221)
Spring. 3 credits. J. Petain.
For description, see MUSIC 221.

AM ST 243 | Inside Out: The American Everyday Interior (also DEA 245, FGSS 243)
For description, see DEA 243.

AM ST 270 | Mapping American (also ART H 270)
For description, see ART H 270.

AM ST 282 | The American Landscape (also LA 282)
Fall. 3 credits. H. Gottfried.
For description, see LA 282.

AM ST 35U | U.S. Art from FDR to Reagan (also ART H 365)
For description, see ART H 365.

AM ST 360 | Painting and Everyday Life in Nineteenth-Century America (also ART H 360)
Spring. 4 credits. L. L. Meixner.
For description, see ART H 360.

AM ST 390 | American Architecture and Building I (also ARCH 390)
Fall. 3 credits. Prerequisites: ARCH 181–182 or permission of instructor. M. Woods.
For description, see ARCH 390.

AM ST 391 | American Architecture and Building II (also ARCH 391)
Spring. 3 credits. Prerequisites: ARCH 181–182 or permission of instructor. M. Woods.
For description, see ARCH 391.

AM ST 397 | Special Topics in the History of Architecture and Urbanism (also ARCH 398)
For description, see ARCH 398.

AM ST 462 | Topics in Early Modernism (also ART H 462)
For description, see ART H 462.

AM ST 463 | Art and Social Histories (also ART H 461)
Spring. 4 credits. L. L. Meixner.
For description, see ART H 461.

Honors
Please see description of major for information about registration in these courses.

AM ST 493–494 | Honors Essay Tutorial
493, fall; 494, spring. Up to 4 credits each semester. See R. L. Moore for appropriate advisers.

ANTHROPOLOGY


Anthropology is one of the most diverse disciplines in the university. Spanning human evolution, the development and heterogeneity of language and culture, human history, and the diversity of cultures past and present, the field has broad scope, uses a variety of methods, addresses basic issues about human origins and human life, and maintains a commitment to understanding social life and using this understanding to improve society. Anthropology is an ideal "liberal arts" major. It also serves as a major that, when well designed by the student with his or her adviser, prepares students for a wide range of professional careers, e.g., law, medicine, foreign service, human rights, social services, international development, and business, among others.

Courses for nonmajors: Anthropology welcomes nonmajors into many of its courses. Unless prerequisites are explicitly stated, 200- and 300-level courses do not have formal prerequisites and can be taken by students without prior experience in anthropology. Such students are welcome in these upper-level courses. For additional information to assist nonmajors and students from other colleges in selecting anthropology courses, see the anthropology department web page (falcon.arts.cornell.edu/Anthro/).

The Major

The range and complexity of the field of Anthropology requires active collaboration between the student and a faculty adviser in developing an individualized program of study. To enter the anthropology major, a student must pass one course in each of the two broad introductory areas of anthropology: "Nature and Culture" and "Culture and History" listed below under "Introductory Courses." Provisional acceptance into the major is possible before completing these courses, with permission from the director of undergraduate studies in anthropology. Students are encouraged to contact the director of undergraduate studies or other faculty members as soon as possible in their studies to discuss their interests and a possible major in anthropology.
Students see the director of undergraduate studies to apply to the major and get an adviser. They prepare a short statement about their interests and goals for the major, then meet with their adviser to develop a course plan reflecting these special interests. This concentration will include at least 32 credits in addition to the two introductory courses used to enter the major. Examples of possible concentrations are myth and ritual; ethnicity and identity; action research; nature and culture in human history; anthropology and literature, or law, or the arts, or medicine; human origins; ethnomusicology; primates and human behavior; prehistory of the Americas, Europe, or Africa; cultural construction of the person within society. The adviser is free to approve up to two cognate courses from other departments totaling up to eight credit hours to fulfill the 32-credit requirement. Students may revise their program of study in consultation with their adviser as they move through their studies. Our goal is to provide a close and supportive advising relationship and a strong and coherent structure for the student's major.

All anthropology majors are required to take one Anthropology seminar at the 400 level during their senior year (463, 420, and 458 are not seminar courses and do not count as requirements). These seminars are designed to provide broad integrating perspectives on the field of anthropology by engaging important issues in contemporary anthropology.

Study abroad and off-campus study programs: 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 adviser.

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.

Other anthropologically relevant study abroad options, using existing Cornell Abroad and 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 adviser, and Cornell Abroad.

Honors
Honors in anthropology are awarded for excellence in the major, which includes overall grade point average and completion of an honors thesis. Anthropology majors interested in the Honors Program should consult the chair of the Honors Committee in their junior year. To qualify for entrance into the Honors Program, a student must have at least a 3.0 GPA overall and 3.3 GPA in the major, and the consent of a faculty member in anthropology who will guide the honors thesis. After applying to the program and being admitted as a candidate by the Honors Committee, the student conducts research and writes a thesis. This thesis is evaluated by the faculty research adviser and two other faculty members. Honors (i.e., cum laude, magna cum laude, or summa cum laude) are awarded based on the quality of the thesis and the student's overall record. Honors in Anthropology may start this process by consulting their major adviser about the honors program early in their junior year.

In addition, students may enroll in ANTHR 483 (fall or spring) "Honors Thesis Research." To complete the thesis, students must enroll in 491 (fall or spring) "Honors Thesis Writing." Only ANTHR 483 may count toward hours for completion of the anthropology major requirements. The credit hours for these courses are variable, grades for these courses are given by the faculty research adviser, and they are based on performance during thesis research and writing.

Any honors candidate whose research directly involves working with human subjects must receive approval for the project from the Cornell University Committee on Human Subjects.

Special Programs and Facilities
Collections: the department has an extensive collection of archaeological and ethnological materials housed in the anthropology collections. A limited number of students can make arrangements to serve as interns in the anthropological 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 anthropologist (McGraw 1965) 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 Anthropology 497, Topics in Anthropology, a course open to a limited number of juniors and seniors who have obtained consent and supervision of a faculty member. Undergraduates should note that many 600-level courses are open to them by consent of the instructor.

Colloquia: The Department of Anthropology holds colloquia almost every week of the semester on Friday at 3:30 in McGraw 215. 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 Anthropology Department web page (falcon.arts.cornell.edu/Anthru/).

I. Introductory Courses

A. Nature and Culture:

ANTHR 101 Introduction to Anthropology: Biological Perspectives on the Evolution of Humankind (IPBS Supplementary List)
Fall. 3 credits. Fee for lab usage and maintenance, $8. A. Clark Arcadi.

The evolution of humankind is explored through the fossil record, studies of the biological differences among current human populations, and a comparison with our closest relatives, the primates. This course investigates the roots of human biology and behavior with an evolutionary framework.

ANTHR 103 The Scope of Anthropology
Spring. 1 credit. Prerequisite: concurrent enrollment in or prior completion of ANTHR 101 or ANTHR 102. This course does not satisfy the major requirement to take two broad introductory courses. S-U grades only. Staff.

This course is intended for majors or prospective majors in anthropology. Each week a different member of the faculty in anthropology at Cornell makes a presentation on the nature of his or her work within the field and discusses 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 203 Early People: The Archaeological and Fossil Record (also ARKEO 203) @ (III) (HA)

[ANTHR 211 Sophomore Seminar: Nature and Culture @ (III) (SBA)

This is a special seminar sponsored by the John S. Knight Institutes Sophomore Seminars Program Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the disciplines' outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to producing instruction with top university professors.

[ANTHR 275 Human Biology and Evolution (also BIOEE 275 and NS 275) (I) (PBS)
Fall. 3 credits. Not offered 2004–2005. Offered alternate years. J. D. Haas.]

B. Culture and History:

ANTHR 100 Introduction to Archaeology (also ARKEO 100) @ (III or IV) (HA)
Fall. 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 102 Introduction to Anthropology: The Comparison of Cultures @ (III) (GA)
Spring. 3 credits. K. March.

An introduction to cultural anthropology through ethnographies, or the descriptive accounts of anthropologists. Through readings and lectures, students acquaint themselves with a number of cultures from several parts of the world. The cultures range in form from those of small-scale tribal societies to those of state societies. Throughout the course,
we attempt to make sense of exotic cultures in their own terms. Attention is focused on variation in cultural patterns as they are expressed in social, economic, and ritual practices. In this encounter, the principles of anthropology as a comparative enterprise that posits distinct cultural systems in belief are developed. Fiction, films, and exercises supplement the formal anthropological materials.

ANTHR 103 The Scope of Anthropology
Spring. 1 credit. Prerequisite: concurrent enrollment in or prior completion of ANTHR 101 or ANTHR 102. This course does not satisfy the major requirement to take two broad introductory courses. S-U grades only. Staff. For course description, see section I.A., Introductory Courses.

ANTHR 200 Cultural Diversity and Contemporary Issues (III) (SBA)
Fall. 3 credits. A. Willford. This course introduces students to the meaning and significance of forms of cultural diversity for understanding contemporary issues. Drawing from films, videos, and selected readings, students are confronted with different representational forms that portray cultures in various parts of the world and they are asked to critically examine their own prejudices as they influence the perception and evaluation of cultural differences. We 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). A number of topics considered: "political correctness" and truth, nationalism and ecological diversity; race, ethnicity, and sexuality; sin, religion, and war; and global process and cultural integrity.

ANTHR 215 Stone Age Art (also ARKEO 215) # (III) (CA)
Fall. 3 credits. T. Volman. A survey of 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 240 Old World Prehistory (also ARKEO 240) # (III) (HA)
Fall. 3 credits. Not offered 2004–2005.

II. Honors and Independent Study

ANTHR 483 Honors Thesis Research
Fall or spring. Credit TBA. Prerequisite: consent of the Honors Committee. Staff. Independent work under the close guidance of a faculty member selected by the student.

ANTHR 491 Honors Thesis Write-Up
Fall or spring. Credit TBA. Staff.

ANTHR 497 Independent Study: Undergrad II
Fall or spring. Credit TBA. Intended for undergraduate students only. 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 498 Independent Study: Undergrad II
Fall or spring. Credit and hours TBA. Intended for undergraduate students only. Staff. For course description, see ANTHR 497, section II. Honors and Independent Study.

III. Understanding Cultures and Societies

Anthropologists examine the diversity of human behaviors, social relationships and structures, economies, political and legal orders, worldviews, logics, languages, symbols, myths, and religions among the many other means humans invent to create and reproduce social life around the world. Anthropologists work from a holistic perspective to account for differences and similarities across cultures. Anthropologists also take small-scale societies and local sociocultural systems as the object of analysis. They collect data primarily through ethnographic fieldwork, that is, months or years of participating in and observing of the societies they study. Anthropologists seek inherent linkages between the practical and the meaningful dimensions of human existence:

A. Anthropological Approaches to Economy, Society, Law, and Politics:
The courses below take as their starting point what are usually defined as the social, political, legal, and economic practices and structures of human life and show how they are shaped culturally and how they shape culture.

[ANTHR 310 Nationalism and Revivalism (III) (CA)

ANTHR 313 Topics in the Anthropology of Japan (III) (SBA)
Spring. 4 credits. H. Miyazaki. In this survey course, we seek to understand contemporary Japanese society by focusing on a particular social and cultural issue hotly debated in Japan. The ultimate goal of the course is to appreciate anthropology as a particular form of engagement with contemporary issues, distinct from other forms of engagement such as journalism, policy-oriented social research, and philosophical and ethical contemplation. No prior knowledge of Japan or anthropology is necessary to take this course.

ANTHR 321 Sex and Gender in Cross-Cultural Perspective (also ANTHR 621 and FGSS 252/631) (III) (SBA)
Fall. 4 credits. K. March. An introduction to the study of sex roles cross-culturally and to anthropological theories of sex and gender. The course 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 323 Kinship and Social Organization (III) (SBA)
Spring. 4 credits. A. Lambert. Much of this course is a survey of forms of the family, descent groups, and marriage systems. The role of age and sex in the social structure is also considered. The last part of the course is devoted to a history of the British and American family and to its fate in utopian communities.

ANTHR 325 Anthropology of the University
Spring. 4 credits. D. Greenwood. Turning an anthropological gaze on the contemporary university as a social and cultural system, this seminar involves an examination of the convergences and divergences between the trajectories of the sciences and engineering, the humanities, and the social sciences in contemporary universities; and some international comparisons with the trajectories of universities around the world. The overall aim is to link an ethnographic analysis of the microstructures of departmental differentiation, professional hegemonies, and local financing with the larger-scale processes of privatization, corporativization, globalization, and competition from a host of alternative higher-education institutions.

ANTHR 326 Economic Anthropology (III) (SBA)

ANTHR 328 Conflict, Dispute Resolution, and Law in Cultural Context (III) (SBA)

ANTHR 382 Human Rights, Cultural Rights, and Economic Rights: Views from the South
Spring. 4 credits. J. Schess. Globalization, democratization, and new emphasis on universal human rights have radically altered the way people understand themselves as "members" of a global world. This course examines contemporary social, political, and economic claims in Africa and Latin America, juxtaposing three rights concepts—cultural (i.e., group/indigenous), economic, and environmental—as key components of human rights.

ANTHR 385 The Anthropology of Intellectuals (III) (CA)

ANTHR 388 Masks of Power and Subversion (also ANTHR 688) (III) (SBA)
Fall. 4 credits. J. Rigi. The aim of the course is to provide a broad theoretical and ethnographic orientation on various forms of power relations, strategies of resistance/subversion and the role of human agency in historical change. The course explores various concepts of power on both macro and micro levels; tracing their genealogies and looking comparatively at relevant ethnographies. Although a pillar of the course is the comparative anthropology of state, it also examines power relations in stateless societies. Various forms of state are contrasted to each other on the one hand and to forms of political power in the stateless societies on the other. The course also covers micro processes of power relations related to gender relations and body politics.

ANTHR 422 Anthropology and Environment (III) (SBA)
Fall. 4 credits. Prerequisite: anthropology major or permission of instructor. Not offered 2004–2005. D. Holmberg.
Anthropology constructs its theories in the comparison of different social and cultural systems and thus depends integrally on knowledge about particular places. The courses below are all focused on the cultures and societies of particular areas of the world and organize knowledge about these areas in reference to key anthropological questions. Students without prior experience in anthropology are welcome in these courses.

ANTHR 210 Sophomore Seminar: South Asian Diaspora (also AAS 210)
Spring. 3 credits. Limited to 15. Sophomore Writing Seminar. V. Munasinghe.
This interdisciplinary course (with an emphasis in anthropology) will introduce students to the multiple routes/roots, lived experiences and imagined worlds of South Asians who have traveled to various lands at different historical moments spanning Fiji.
the United States, Trinidad, and even within South Asia itself such as the Tamil-speaking South Africa, Mauritius, Britain, Malaysia, and Singapore. Diaspora continues to the present. The primary exercise is to ask what, if any, are the ties that bind a fifth-generation Indo-Trinidian whose ancestor came to the New World as an indentured laborer or "coolie" in the mid-nineteenth century to labor in the cane fields to become a medical doctor who migrated to the United States in the late 1980s. If diaspora violates a sense of identity based on territorial integrity, then could "culture" serve as the basis for a shared identity?

This is a special seminar sponsored by the John S. Knight Institutes Sophomore Seminars Program. Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the disciplines outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

ANTHR 221 Anthropological Representation: Ethnicities on the North American Plains @ (III) (CA)
Fall. 3 credits. V. Santiago-Irazary.
Representation is basic to anthropology. In translating cultures, anthropologists produce authoritative representations of and about other people's lives. In this course, we examine, with a critical eye, the production of representations about U.S. Latino cultures as these are embodied in anthropological texts. Issues to be explored include the relation between the ethnographer and the people s/he is studying, the contexts in which ethnographic texts are produced, and the way they may position different cultural groups within the larger national context.

ANTHR 230 Cultures of Native North America @ III (III) (CA)
Fall. 4 credits. C. A. Willford.
A survey of the principal Eskimo and American Indian cultures: areas north of Mexico. Selected cultures are examined to bring out distinctive features of the economy, social organization, religion, and worldview. Although the course concentrates on traditional cultures, some lectures and readings deal with changes in native ways of life that have occurred during the period of European-Indian contact.

ANTHR 260 Japanese Popular Culture @ III (III) (CA)
Fall. 4 credits. H. Miyazaki.
This course examines a wide range of genres of Japanese popular culture from manga to fashion, musical, jazz and techno music from an anthropological perspective. Topics of investigation include gender and sexuality, nationalism and nostalgia, and problems of authenticity and creativity.

ANTHR 303 Asians in the Americas: A Comparative Perspective (also AAS 303) @ III (III) (CA)
Fall. 4 credits. V. Munasinghe.
A survey of the rise and decline of civilizations in the Andean region of western South America before the European invasion. Key topics include the use of invasions, trade, and ethnographic information to interpret Pre-Columbian societies, the emergence of settled farming life, and the development of the state.

ANTHR 377 The United States (also LSP 377 and AM ST 377) @ (III) (CA)
Fall. 4 credits. Not offered 2004-2005.
V. Santiago-Irazary.

ANTHR 383 Topics in African Ethnography: The State and Civil Society in Colonial and Contemporary Africa @ (III) (SBA)
Fall. 4 credits. Not offered 2004-2005.
J. Schoss.

ANTHR 384 Africa in the Global Economy (also ANTHR 784) @ (III) (SBA)
Fall. 4 credits. Not offered 2004-2005.
J. Schoss.

ANTHR 413 Religion and Politics in Southeast Asia (also ASIAN 413) @ (III) (CA)
Spring. 4 credits. A. Willford.
This course explores how religious beliefs and practices in Southeast Asia have been transformed by the combined forces of colonialism, nationalism, and globalization. By examining both diversity and resurgence in one of the world's most rapidly modernizing regions, we aim to understand the common economic, social, and political conditions that are contributing to the popularity of contemporary religious movements. At the same time, we also consider the unique ideological, theological, and cultural understandings behind different religions and movements. Through this process we also rethink conceptions of modernity.

ANTHR 421 Comparative Islamic Movements
Fall. 4 credits. Not offered 2004-2005.
J. Riggi.

ANTHR 441 Himalayan Ethnographies (also ANTHR 741) @ (III) (CA)
Fall. 4 credits. Not offered 2004-2005.
D. Holmberg.

ANTHR 442 Violence, Symbolic Violence, Terror, and Trauma in South Asia and the Himalayas (also ANTHR 642) @ (III) (CA)
D. Holmberg.

ANTHR 450 Europe (also ANTHR 750) @ (III) (II)
Fall. 4 credits. D. Boyer, D. Greenwood, J. Riggi.
Examples are postcolonial transitions, the ethnographic representation of transnational relations and institutions in Europe, integration in the West and disintegration in the East of Europe, immigration, regionalism, and ethnic conflict. Each year it is staffed by one of the three Europeanists in the Department of Anthropology—Dominic Boyer (post-Socialist transition), Dayvid Greenwood (ethnicity and nationalism), and Jakob Rigi (post-Socialist capitalism). The course serves to balance the area curriculum of the department by adding Europe to our offerings. It also serves the Modern European Studies Concentration and the International Relations Concentration.
ANTHR 456 Mesoamerican Religion, Science and History @ (III) (CA)
Fall. 4 credits. J. Henderson.
For description, see section III B. Understanding Cultures and Societies.

[ANTHR 462 Catalhoyuk and Archaeological Practice (also ANTHR 662 and ARKEO 462/762) @ (III) (HA)

[ANTHR 477 Ethnology of Island Southeast Asia @ (III) (CA)
Fall. 4 credits. Not offered 2004–2005.]

[ANTHR 493 Seminar in Archaeology: The Aztecs (also ARKEO 493) (III) (HA)
Fall. 4 credits. Not offered 2004–2005.]

IV. Anthropological Thought and Method
As a form of inquiry, anthropology has a long and complex history and utilizes a wide variety of theories and methods. In this section, topics in the history of anthropological thought and numerous anthropological approaches are presented, along with courses focused on the design of anthropological research projects.

ANTHR 215 Stone Age Art (also ARKEO 215) @ (III) (CA)
Fall. 3 credits. T. Volman.

[ANTHR 306 Ethnographic Description (III)
Fall. 4 credits. Not offered 2004–2005.]

ANTHR 324 Anthropology Amongst the Disciplines (III) (CA)
Spring. 4 credits. J. Siegel.
Ethnography has as one of its aims the comprehension of the "other" in whose eyes the "I" or the first person is constructed. The history of this idea in Western philosophy and literature has influenced anthropologists' understanding. We look at this history and its influence in ethnography, particularly in the study of ritual.

[ANTHR 330 Humans and Animals (also ARKEO 330) @ (III) (CA)

ANTHR 362 Democratizing Research: Participation, Action, and Research (also ANTHR 662) (III) (SBA)
Fall. 4 credits. D. J. Greenwood.
This course poses an alternative to distanced, "objectivist" social science by reviewing some of the numerous approaches to socially engaged research. Among the approaches discussed are those centering on the pedagogy of liberation, feminism, the industrial democracy movement, "Southern" participatory action research, action science, and participatory evaluation. There are no prerequisites and undergraduates are welcome.

ANTHR 368 Marx: An Overview of His Thought (also ANTHR 668) (III) (SBA)
Spring. 4 credits. J. Riggi.
A reading and interpretation of Marx's principal writings, emphasizing both the continuities and the changes from his earlier to his later works, with attention given to contemporary developments and controversies in Marxian scholarship.

[ANTHR 372 Hunters and Gatherers (also ANTHR 672 and ARKEO 372/672) # (III) (SBA)
Fall. 4 credits. Not offered 2004–2005. T. Volman.]

[ANTHR 403 The Craft of Anthropology: Ethnographic Field Methods (also ANTHR 603) (SBA)
Fall. 4 credits. V. Santiago-Trinay.
This course will give students a practical understanding of what anthropologists actually do in the field. We examine problems that emerge in conducting fieldwork which raise ethical, methodological, theoretical, and practical issues in the observation, participation in, recording, and representation of culture(s). Students are expected to develop a semester-long local research project that allows them to experience fieldwork situations.

[ANTHR 405 Archaeology Research Design (also ANTHR 605 and ARKEO 405/605) (III) (SBA)
Spring. 4 credits. Not offered 2004–2005.]

[ANTHR 412 Contemporary Anthropological Theory (III) (CA)
Spring. 4 credits. Not offered 2004–2005.]

ANTHR 420 Development of Anthropological Thought (also ANTHR 720) (III) (SBA)
Fall. 4 credits. Prerequisite: undergraduates must have two prior anthropology courses or permission of instructor. J. Fajans.
An examination of the history and development of anthropological theory and practice. The course 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 450 Archaeological Analysis (also ANTHR 455 and ARKEO 450/455/456) (III) (SBA)
Spring. 4 credits. Prerequisite: one course in archaeology or permission of instructor. Limited to 15 students. Not offered 2004–2005. J. Henderson.]

[ANTHR 459 Archaeology of the Household (also ANTHR 655 and ARKEO 459/659) # (III) (HA)
Fall. 4 credits. Not offered 2004–2005.]

ANTHR 463 Zoorarchaeological Method (also ARKEO 463) (IPBS Supplementary List)

[ANTHR 464 Zoorarchaeological Interpretation (also ARKEO 464) (IPBS Supplementary List)

[ANTHR 467 Origins of Agriculture (also ARKEO 467) # (III) (HA)
Spring. 4 credits. Not offered 2004–2005.]

ANTHR 480 Anthropology and Globalization (also ANTHRO 680) (III)
Fall. 4 credits. A. Willford.
This course examines anthropological perspectives on globalization and assesses the cultural, political, and social implications of contemporary global processes. In exploring the factors that are contributing to the production of diasporic consciousness, the intensity and variety of transnational flows of culture, commodities, corporations, and people are considered to assess challenges these processes pose to the modern nation-state. Has culture been liberated from the control of the nation-state through the emergence of new cultural networks created by immigration, electronic media, tourism, and multinational corporations and organizations? Or, has the acceleration of global processes within the modern world system created new tools of domination within an increasingly stratified global economy? This course addresses these and related questions utilizing both anthropological theories and ethnographic studies on globalization, ethnicity, diaspora, and nationalism.

ANTHR 487 Field Research Abroad
Fall or spring. Credit TBA. Intended for undergraduate students only. Staff.
Field research abroad as part of the Cornell-Honduras Program, the Cornell-Honduras Program, or other departmentally approved programs. Topics are selected and project proposals prepared by students in consultation with faculty. Fieldwork typically involves extended research (usually four-six weeks) in a foreign setting with faculty supervision, culminating in a major paper or report.

[ANTHR 494 Seminar in Archaeology: The Archaeology of Human Origins (also ARKEO 494) (III) (HA)
Spring. 4 credits. Not offered 2004–2005.]

[ANTHR 495 Action Research Practicum
Fall and spring. 2 credits. Prerequisite: student must be holder of Bartels Action Research Undergraduate Fellowship. Not offered 2004–2005. D. Greenwood.]

V. Human History and Archaeology
Archaeology tells the story of human origins, the invention of farming and settled life, the rise of complex social institutions and technologies, and the development of the past, while also teaching field and laboratory methods for uncovering the human past.

[ANTHR 203 Early People: The Archaeological and Fossil Record (also ARKEO 203) # (III) (HA)

ANTHR 215 Stone Age Art (also ARKEO 215) # (III) (CA)
Fall. 3 credits. T. Volman.
For description, see IB. Introductory Courses.

[ANTHR 240 Old World Prehistory (also ARKEO 240) # (III) (HA)
Spring. 3 credits. Not offered 2004–2005.]

[ANTHR 242 Early Agriculture (also ARKEO 242) # (III) (HA)

ANTHR 317 Stone Age Archaeology (also ARKEO 317) (III) (HA)
Fall. 4 credits. 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 330 Humans and Animals (also ARKEO 330) # (III) (CA)

ANTHR 355 Ancient Mexico and Central America (also ARKEO 355) @ # (III) (HA)

ANTHR 356 Archaeology of the Andes (also ARKEO 356) @ # (III) (HA)
Spring. 4 credits. J. Henderson. For description, see section IIC, Understanding Cultures and Societies.

ANTHR 370 Environmental Archaeology (also ANTHR 670 and ARKEO 370/670) (l/PBS Supplementary List)

ANTHR 372 Hunters and Gatherers (also ANTHR 672 and ARKEO 372/672) @ # (III) (SBA)

ANTHR 405 Archaeological Research Design (also ANTHR 405 and ARKEO 405/605) (III) (SBA)

ANTHR 409 Approaches to Archaeology (also ANTHR 609 and ARKEO 409/609) (III) (CA)

ANTHR 456 Mesoamerican Religion, Science, and History (also ARKEO 456) @ # (III) (CA)
Fall. 4 credits. J. Henderson. For description, see section IIB, Understanding Cultures and Societies.

ANTHR 458 Archaeological Analysis (also ANTHR 658 and ARKEO 458/658) (III) (SBA)

ANTHR 459 Archaeology of the Household (also ANTHR 659 and ARKEO 459/659) @ # (III) (HA)

ANTHR 462 Catalhoyuk and Archaeological Practice (also ANTHR 762 and ARKEO 462/762) @ # (III) (HA)

ANTHR 463 Zooarchaeological Method (also ARKEO 463) (IPBS Supplementary List)

ANTHR 464 Zooarchaeological Interpretation (also ARKEO 464) (IPBS Supplementary List)

ANTHR 467 Origins of Agriculture (also ARKEO 467) @ (III) (HA)

VI. Nature and Culture

Thinking about nature and culture and their interaction is central to contemporary anthropology. The courses in this section present a biological and evolutionary perspective on behavior, focus on the interplay between nature and culture, and discuss the controversies surrounding these relationships between these dimensions of human life.

ANTHR 208 Anthropology of Human Mating (IPBS Supplementary List)
Spring. 4 credits. M. Small. This course explores the human mating career from evolutionary, biological, and current behavioral perspectives. The course includes evolutionary theory, focusing on the concepts of reproductive success, mate choice, parental investment, sexual selection, and mating strategies. Lectures also include the hormonal, chemical, nervous-system contributions to animal sexuality, and ectopic forms of mating and marriage across culture.

ANTHR 211 Sophomore Seminar: Nature and Culture (III) (SBA)

As a special seminar sponsored by the John S. Knight Institutes Sophomore Seminars Program, seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the study within an interdisciplinary context. Special emphasis is given to strong thinking modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Relevant courses in other departments

BIOL 247 Ethnobiology
Fall. 3 credits. D. M. Bates.

BIOL 348 The Healing Forest

MUSIC 245 Gamelan in Indonesian Society

NS/HD/R&SOC 347 Human Growth and Development: Biological and Social Interactions

ANTHR 363 Gender and Age in Archaeology (also ANTHR 665, ARKEO 469/669) # (III) [SBA]

ANTHR 469 Gender and Age in Archaeology (also ANTHR 665, ARKEO 469/669) # (III) [SBA]

ANTHR 493 Seminar in Archaeology: The Aztecs (also ARKEO 493) [HA]

ANTHR 494 Seminar in Archaeology: The Archaeology of Human Origins (also ARKEO 494) (III) (HA)

ANTHR 499 Topics in Biological Anthropology

ANTHR 600, ARKEO 469/669) # (III) (SBA)

ANTHR 750 Seminar in Archaeology: The Aztecs (also ARKEO 493) (HA)

ANTHR 827 Sophomore Seminar: Nature and Culture (III) (SBA)

ANTHR 828 PhD Approaches to Archaeology (also ANTHR 609 and ARKEO 409/609) (III) (CA)

ANTHR 829 Anthropology and Environment (III) (CA)
Fall. 4 credits. Limited to 15 students. Prerequisite: anthropology major or permission of instructor. Not offered 2004–2005. D. Holmberg.

Graduate Seminars

The graduate program in anthropology is described in much greater detail on the anthropology department web page at falcon.arts.cornell.edu/Anthro/. The seminars described immediately below pertain to the program in sociocultural anthropology. For information about graduate study in anthropology and biological anthropology, see the anthropology department web page.

A core set of seminars is required of all graduate students in sociocultural anthropology: ANTHR 600 and 601. ANTHR 603 is strongly recommended. These courses are open to graduate students from other related fields. This sequence, and the graduate

VII. Graduate Seminars

ANTHR 375 Evolutionary Theory and Human Behavior (also ANTHR 675) (IPBS Supplementary List)

ANTHR 390 Primate Behavior and Ecology (IPBS Supplementary List)

ANTHR 409 Approaches to Archaeology (also ANTHR 609 and ARKEO 409/609) (III) (CA)

ANTHR 600, ARKEO 469/669) # (III) (SBA)

ANTHR 609 Topics in Biological Anthropology
ANTHR 600 Proseminar: Culture and Symbol
Fall. 6 credits. J. Siegel.
This course 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., we investigated these social and cultural activities as interrelated phenomena. Works of de Saussure, Levi-Strauss, Dumont, Geertz, Victor Turner, Sahlin, and others, as well as contemporary theories are given careful attention.

ANTHR 601 Proseminar: Social Organization
Spring. 6 credits. D. Boyer.
This course focuses on linkages between culture and social institutions, representations and practices. The nature of these linkages is debated by key theorists. A major focus is on the relationship between theory and method. For description, see ANTHR 403, section IV. Analytical Thought and Method.

ANTHR 604 Praxis and Culture

ANTHR 605 Archaeological Research Design (also ANTHR 405 and ARKEO 409/609)

ANTHR 606 Professional Ethics for Anthropologists

ANTHR 609 Approaches to Archaeology (also ANTHR 409 and ARKEO 409/609)

ANTHR 610 Language and Myth

ANTHR 614 Reading in the Ethnographic Tradition (1880–1960)

ANTHR 615 Reading Contemporary Ethnographies (1960–1990)

ANTHR 616 Cultural Production of the Person (1980–2001)

ANTHR 621 Sex and Gender in Cross-Cultural Perspective (also ANTHR 321 and FGSS 321/631)
Fall. 4 credits. Prerequisite concurrent attendance in the lectures and films of ANTHR FGSS 321 and permission of instructor, K. March.

ANTHR 624 Ethnoracial Identity in Anthropology, Language, and Law (also ANTHR 324)
Spring. 4 credits. V. Santiago-Irizarry.
This course examines the roles that both law and language, as mutually constitutive mediating systems, occupy in constructing ethnoracial identity in the United States.

ANTHR 641 South Asia: Readings in Special Problems

ANTHR 644 Research Design
Spring. 4 credits. J. Schoss.
This seminar focuses on preparing a full-scale proposal for anthropological fieldwork for a dissertation. Topics include identifying 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; identifying ethical issues and human subjects protection procedures; and preparing appropriate budgets. This is a 4-credit seminar, and students will complete a proposal suitable for submission to a major funding agency in the social sciences.

ANTHR 650 Social Studies of Economics and Finance
Fall. 4 credits. H. Miyazaki.
This seminar focuses on recent efforts to extend theoretical insights from the social studies of science to the study of the market. The seminar is designed for graduate students specializing in the study of Chinese culture and society, with particular emphasis on the cultural production of gender, ideology in myth and ritual, the cultural studies of history, and political culture. Topics include Chinese culture, and the use of sources for not a requirement of the course.

ANTHR 632 Andean Symbolism

ANTHR 635 Southeast Asia: Readings in Special Problems
Fall or spring. Credit TBA. Staff.
This seminar focuses on preparing a full-scale proposal for anthropological fieldwork for a dissertation. Topics include identifying 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; identifying ethical issues and human subjects protection procedures; and preparing appropriate budgets. This is a 4-credit seminar, and students will complete a proposal suitable for submission to a major funding agency in the social sciences.

ANTHR 639 Chinese Ethnology
Spring. 4 credits. S. Sangren.
This seminar focuses on preparing a full-scale proposal for anthropological fieldwork for a dissertation. Topics include identifying 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; identifying ethical issues and human subjects protection procedures; and preparing appropriate budgets. This is a 4-credit seminar, and students will complete a proposal suitable for submission to a major funding agency in the social sciences.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Credit Hours</th>
<th>Offered Terms</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTHR 655</td>
<td>East Asia: Readings in Special Problems</td>
<td>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.</td>
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<tr>
<td>ANTHR 656</td>
<td>Maya History (also ARKEO 656)</td>
<td>Spring. 4 credits. J. Henderson. An exploration of Maya understandings of their own history, drawing on ethnographic, historical, and archaeological sources. Analysis of hieroglyphic inscriptions from ancient Maya cities is a major focus.</td>
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<tr>
<td>ANTHR 662</td>
<td>Democratizing Research: Participation, Action, and Research (also ANTHR 362)</td>
<td>Fall. 4 credits. D. J. Greenwood. For description, see ANTHR 362, Section IV, Anthropological Thought and Method.</td>
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<tr>
<td>ANTHR 663</td>
<td>Action Research</td>
<td>Spring. 4 credits. D. Greenwood. This seminar is a practicum in action research (AR) in which the semester becomes a self-managing learning environment for the exploration of the techniques and group processes involved in AR, including co-generative learning, searching, and AR facilitation. Participation in a seminar-centered listserv on the Internet is expected.</td>
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<tr>
<td>ANTHR 667</td>
<td>Contemporary Archaeological Theory (also ARKEO 667)</td>
<td>Fall. 4 credits. Prerequisite: undergraduates with permission of instructor only. Not offered 2004–2005. N. Russell.</td>
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<tr>
<td>ANTHR 668</td>
<td>Marx: An Overview of His Thought (also ANTHR 368)</td>
<td>Spring. 4 credits. J. Rigi. For course description, see ANTHR 368, section IV, Anthropological Thought and Method.</td>
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<tr>
<td>ANTHR 671</td>
<td>Palaeoanthropology of South Asia (also BIOEE 671 and ASIAN 620)</td>
<td>Fall. 3 credits. K. A. R. Kennedy. For description, see BIOEE 671.</td>
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<tr>
<td>ANTHR 672</td>
<td>Hunters and Gatherers (also ANTHR and ARKEO 372/672)</td>
<td>Fall. 4 credits. Not offered 2004–2005. T. Volman.</td>
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<tr>
<td>ANTHR 673</td>
<td>Human Evolution: Concepts, History, and Theory (also BIOEE 673)</td>
<td>Fall. 3 credits. Prerequisite: one year of introductory biology. ANTHR 101, or permission of instructor. Offered alternate years. K. A. R. Kennedy. For description, see BIOEE 673.</td>
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<tr>
<td>ANTHR 680</td>
<td>Anthropology and Globalization (also ANTHR 480)</td>
<td>Fall. 4 credits. A. Willford. For description, see ANTHR 480, section IV, Anthropological Thought and Method.</td>
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<tr>
<td>ANTHR 681</td>
<td>Empire and Imperialism</td>
<td>Spring. 4 credits. J. Rigi. This course deals with histories and ethnographies of empire from a comparative perspective. It focuses on the modern era, though it also considers ancient and medieval forms of empire. The course explores the formation of the world system with reference to contemporary theories of globalization over the last five hundred years. It examines the formation of hegemonies, hegemonic crises, and transformations. Particular attention is paid to the current hegemonic crisis with regard to globalization and neoliberalism and the responses of ordinary people to such crises. We revisit old theories and discuss new elaborations of these concepts, including a spectrum of views and political positions from the right to the left.</td>
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<tr>
<td>ANTHR 693</td>
<td>Law and Social Movement in East Asia (also LAW 744)</td>
<td>Spring. 4 credits. Not offered 2004–2005. A. Riles.</td>
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<tr>
<td>ANTHR 701</td>
<td>Independent Study: Grad I</td>
<td>Fall or spring. Credit TBA. Intended for graduate students only. Staff.</td>
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<tr>
<td>ANTHR 702</td>
<td>Independent Study: Grad II</td>
<td>Fall or spring. Credit TBA. Intended for graduate students only. Staff. For course description, see ANTHR 701, section VII, Graduate Seminars.</td>
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<tr>
<td>ANTHR 703</td>
<td>Independent Study: Grad III</td>
<td>Fall or spring. Credit TBA. Intended for graduate students only. Staff. For course description, see ANTHR 701, section VII, Graduate Seminars.</td>
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<tr>
<td>ANTHR 720</td>
<td>Development of Anthropological Thought (also ANTHR 420)</td>
<td>Fall. 4 credits. J. Fajans. For description, see ANTHR 420, section IV, Anthropological Thought and Method.</td>
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<tr>
<td>ANTHR 745</td>
<td>Europe (also ANTHR 450)</td>
<td>Fall. 4 credits. D. Boyer, D. Greenwood, J. Rigi. For course description, see ANTHR 450, section III, A., Understanding Cultures and Societies.</td>
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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 100 or one of the basic courses as defined below before they will be admitted to the major. This course will not be counted toward the major requirements.

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 adviser 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 300 level or above. At least two courses must be taken from each of the following categories: B. Anthropological Archaeology; C. Classical, Near Eastern, and Medieval Archaeology; and D. Methodology and Technology. Only four credits of ARKEO 300 (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 grade point average in the major and a 3.0 grade point overall. They should consult with the director of undergraduate studies before the beginning of the senior year. The honors essay is normally prepared over two semesters in consultation with a faculty adviser during the senior year. Students enroll in ARKEO 481 Honors Thesis Research, and to complete the thesis, they enroll in ARKEO 482 Honors Thesis Writeup. Both courses are offered in the fall and spring. Only ARKEO 481 may count toward hours for completion of the archaeology major requirements. The credit hours for these courses are variable.

Fieldwork. Every student should gain some practical experience in archaeological fieldwork on a project authorized by his or her adviser. 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 Concentration
Students in Cornell schools and colleges other than Arts and Sciences may elect a concentration in archaeology. To concentrate 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 100 and four other courses from categories D, E, F, or G (described above), at least three of which must be basic courses, or 2) five courses from categories B-D, at least four of which must be basic courses. Concentrators 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 seminar brochure.

I. Introductory Courses and Independent Study Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisite</th>
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<tbody>
<tr>
<td>ARKEO 100</td>
<td>Introduction to Archaeology (also ANTHR 100)</td>
<td>3</td>
<td>Basic: J. Henderson</td>
</tr>
<tr>
<td>ARKEO 300</td>
<td>Individual Study in Archaeology and Related Fields</td>
<td>4</td>
<td>ARKEO 100 or permission of instructor</td>
</tr>
<tr>
<td>ARKEO 481</td>
<td>Honors Thesis Research</td>
<td>4</td>
<td>Prerequisite: admission to Honors Program</td>
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<tr>
<td>ARKEO 482</td>
<td>Honors Thesis Writeup</td>
<td>4</td>
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<tr>
<td>ARKEO 600</td>
<td>Special Topics in Archaeology</td>
<td>4</td>
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<tr>
<td>ARKEO 681-682</td>
<td>Master’s Thesis</td>
<td>6</td>
<td>Fall: 681, spring: 682</td>
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</table>

II. Anthropological Archaeology

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ARKEO 203</td>
<td>Early People: The Archaeological and Fossil Record (also ANTHR 203)</td>
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<tr>
<td>ARKEO 215</td>
<td>Stone Age Art (also ANTHR 215)</td>
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<tr>
<td>ARKEO 242</td>
<td>Early Agriculture (also ANTHR 242)</td>
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<tr>
<td>ARKEO 255</td>
<td>Great Empires of the Andes (also ANTHR 255)</td>
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<tr>
<td>ARKEO 317</td>
<td>Stone Age Archaeology (also ANTHR 317)</td>
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<tr>
<td>ARKEO 330</td>
<td>Humans and Animals (also ANTHR 330)</td>
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<tr>
<td>ARKEO 356</td>
<td>Archaeology of the Andes (also ANTHR 356)</td>
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<tr>
<td>ARKEO 409</td>
<td>Approaches to Archaeology (also ARKEO 409 and ANTHR 409/409)</td>
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<tr>
<td>ARKEO 456</td>
<td>Mesoamerican Religion, Science, and History (also ANTHR 456)</td>
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<td>ARKEO 459</td>
<td>Archaeology of the Household (also ARKEO 459 and ANTHR 459/459)</td>
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<td>ARKEO 462</td>
<td>Cataloyuk and Archaeological Practice (also ARKEO 462 and ANTHR 462/462)</td>
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<td>ARKEO 469</td>
<td>Gender and Age in Archaeology (also ARKEO 469 and ANTHR 469/469)</td>
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<td>ARKEO 493</td>
<td>Seminar in Archaeology: The Aztecs (also ANTHR 493)</td>
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<td>ARKEO 494</td>
<td>Seminar in Archaeology: The Archaeology of Human Origins (also ANTHR 494)</td>
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<tr>
<td>ARKEO 609</td>
<td>Approaches to Archaeology (also ARKEO 409 and ANTHR 409/409)</td>
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<td>Course Code</td>
<td>Course Title</td>
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<tr>
<td>ARKEO 422</td>
<td>Minoan-Mycenaean Art and Archaeology (also CLASS 221 and ART H 221)</td>
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<tr>
<td>ARKEO 240</td>
<td>Old World Prehistory (also ANTHR 240)</td>
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<tr>
<td>ARKEO 260</td>
<td>Daily Life in the Biblical World (also NES 262, JWST 262)</td>
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<tr>
<td>ARKEO 266</td>
<td>Jerusalem through the Ages (also NES 266, JWST 266, RELST 266)</td>
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<tr>
<td>ARKEO 265</td>
<td>Ancient Egyptian Civilization (also NES 268 and JWST 268)</td>
</tr>
<tr>
<td>ARKEO 321</td>
<td>Mycenae and Homer (also CLASS 321 and ART H 321)</td>
</tr>
<tr>
<td>ARKEO 362</td>
<td>Sumerian Language and Culture II (also NES 362, JWST 362)</td>
</tr>
<tr>
<td>ARKEO 363</td>
<td>Ancient Iraq II: From the Beginning of the Second Millennium to the Conquest of Alexander the Great (also NES 363, JWST 363)</td>
</tr>
<tr>
<td>ARKEO 380</td>
<td>Introduction to the Arts of China (also ART H 380)</td>
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<tr>
<td>ARKEO 425</td>
<td>Seminar on the Bronze Age Architecture of Asia Minor (also ART H 425 and CLASS 430)</td>
</tr>
<tr>
<td>ARKEO 434</td>
<td>The Rise of Classical Greece (also ART H 434 and CLASS 434)</td>
</tr>
<tr>
<td>ARKEO 435</td>
<td>Seminar on Roman Art and Archaeology (also CLASS 435 and ART H 427)</td>
</tr>
<tr>
<td>ARKEO 629</td>
<td>The Prehistoric Aegean (also CLASS 629)</td>
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<tr>
<td>CLASS 322</td>
<td>Greeks and Barbarians (also ART H 328)</td>
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<tr>
<td>LA 545</td>
<td>The Parks and Fora of Imperial Rome</td>
</tr>
</tbody>
</table>

IV.  Methodology and Technology

| ARKEO 256  | Practical Archaeology (also CLASS 256)                                                                                                     | 3      | J. Coleman    | Spring: 3 credits. Not offered 2004–2005.                          |
| ARKEO 262  | Laboratory in Landscape Archaeology (also LA 262)                                                                                           | 3      | S. Baugher    | Spring: 3 credits. S. Baugher. For description, see LA 262.         |
| ARKEO 285  | Art, Archaeology, and Analysis (also ENGR 185, EAS 200, MS&E 285)                                                                         | 3      | S. Baugher    | Spring: 3 credits. Does not meet liberal studies distribution requirements. Staff. For description, see EAS 200.          |
Asian Studies

E. M. Gunn, chair (350 Rockefeller Hall, 255–5095); A. Blackburn, D. Boucher.

The Department of Asian Studies encompasses the geographical areas of East Asia, South Asia, and Southeast Asia and offers courses in most of the disciplines of the social sciences and the humanities. Forty-five members of the Asian Studies Department specialize in languages, linguistics, literature, and religions, while associated faculty throughout the university teach courses on Asia in their own disciplines, from art history and government to rural sociology. Asian Studies courses offered through the 400 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

A student majoring in Asian Studies normally specializes in the language and culture of one country and often chooses an additional major in a traditional discipline.

Majors complete two courses at the 200 level (a minimum of six credits with a grade of C or better) in one of the Asian languages offered at Cornell. The major consists of at least 30 additional credits (which may include up to six credits of further language study) of courses numbered 200 and above selected by the student in consultation with his or her advisor from among the Asia content courses offered by the Department of Asian Studies and by Asia specialists in other departments.

The applicant for admission to the major in Asian Studies must have completed at least two Asia content courses, one of which can be a language course. Students must receive permission for admission to the major from the director of undergraduate studies. The student must have received a minimum grade of C in those courses and in all other courses counted toward the major.

Honors

To be eligible for honors in Asian Studies, a student must have a cumulative GPA of 3.7 in all Asian Studies area courses, exclusive of language study only, and must successfully complete an honors essay during the senior year. Students who wish to be considered for honors should apply to the director of undergraduate studies during the second term 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 term of the senior year, the student does research for the essay in conjunction with an appropriate Asian Studies course or ASIAN 401. By the end of the first term 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 402, 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.

**Concentration in East Asia Studies**
A candidate for the Bachelor of Arts or Science degree at Cornell may take a concentration in East Asia studies by completing at least 18 credits of course work. Students normally take five courses in East Asian studies at the 200 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 200 level or beyond. East Asian graduate courses may also be offered for the concentration, as well as East Asia-related courses with a research paper on an East Asian topic. Appropriate courses taken through Cornell Abroad in East Asia may also be counted toward the concentration. Students concentrating in East Asia studies should select an adviser from the East Asia Program faculty for consultation on their course of study. For more information, contact the Asian Studies Department at 350 Rockefeller Hall, (607) 255-5095.

**Concentration in South Asia Studies**
A candidate for the Bachelor of Arts or Science degree at Cornell may take a concentration in South Asia studies by completing at least 18 credits of course work in South Asian studies, including ASIAN 215 (Introduction to South Asia) and four courses or seminars at the 200 level or advanced level, two of which may be South Asian language courses.

Students taking a concentration in South Asian studies are considered members of the South Asia Program and will have an adviser from the program faculty. This adviser will be for the student’s concentration and is not a substitute for a student’s academic adviser in his or her major.

One South Asian graduate course may be taken for the concentration with consent of both the instructor and the adviser. The same applies for one South Asia-related course with a research paper on a South Asian subject. Additional courses may be added if offered with comparable South Asia content.

**Concentration in Southeast Asian Studies**
A candidate for the Bachelor of Arts or Science degree at Cornell may take a concentration in Southeast Asian studies by completing 18 credits of course work. A recommended plan would include ASIAN 208 and four courses at the intermediate or advanced stage, two of which could be a Southeast Asian language. Students taking a concentration in Southeast Asian studies are members of the Southeast Asia Program and are assigned an adviser from the appropriate Asian Studies 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.

**Intensive Language Program (FALCON)**
The FALCON Program offers intensive instruction in Japanese or Chinese. The program is still the only one in the world offering a full year of intensive instruction from the elementary level, except for the exclusive language schools of some government agencies. Students must formally apply to the program, but the application process is simple and admission is open to all students. (Applications available for FALCON from the administrative assistant, room 388 Rockefeller Hall, or visit our web site, http://falcon.cornell.edu/falcon and apply online.) Students may take the entire sequence of 160, 161, 162, or any other prerequisite courses or series of courses on fundamental skills (to be determined by a placement test). The courses are full-time intensive language study; the degree of intensity required does not allow students to enroll simultaneously in other courses or to work, except perhaps on weekends. The spring semester of the Chinese program is expected to be offered in Beijing at Tsinghua University.

**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 institutions. 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 term 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 term 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.

**First-Year Writing Seminars**
See John S. Knight Institute brochure for times, instructor, and descriptions.

**General Education Courses**

**ASIAN 125 Introduction to the Urdu Script (also URDU 125)**
Spring. 1 credit. Prerequisite: HINDI 101 or permission of instructor. A. Fatih.
See URDU 125 for description.

**ASIAN 191 Introduction to Modern Asian History (also HIST 191) @ (III) (HA)**
Fall. 4 credits. T. Loos.
See HIST 191 for description.

**ASIAN 192 Introduction to World Music: Asia (also MUSIC 104) @ (IV) (CA)**

**ASIAN 206 The Occidental Tourist: Travel Writing and Orientalism in Southeast Asia (also HIST 207 and 507) @ (III)**
Fall. 4 credits. T. Loos.
For description, see HIST 207.

**ASIAN 208 Introduction to Southeast Asia @ (II or IV) (CA)**
Fall. 3 credits. L. Paterson.
This course is for anyone curious about the most diverse part of the world in terms of 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.

**ASIAN 211 Introduction to Japan: Japanese Texts in History @ & (IV) (HA)**
Fall. 3 credits. B. deBarry.
An introduction to Japanese studies for nonmajors. The course takes up diverse cultural artifacts and demonstrates how the meanings and readings generated by these artifacts have changed over time. We consider the eighth-century Kojiki, the courtly
This course explores a range of religious traditions in South Asia (Pakistan, India, and Sri Lanka) and East Asia (China and Japan) for description, see HIST 249.

ASIAN 251 Introduction to South Asian Civilization @ (IV) (HA)
Spring. 3 credits. Stafl.
An interdisciplinary introduction to the cultures and histories of South Asia, with special attention to religion, political authority, and the arts. Designed for students not majoring in Asian Studies.

ASIAN 218 Introduction to Korea (also HIST 218) @ (III or IV) (CA)
Spring. 3 credits. M. Shin.
A 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.

ASIA—Literature and Religion Courses

The following courses are taught entirely in English and are open to any Cornell student.

[ASIAN 220] Buddhism in America (also RELST 220)
J. M. Law.

[ASIAN 228] The Indian Ocean World (also HIST 228)
Fall. 4 credits. Limited to 15 students.
E. Tagliacozzo.
For description, see HIST 228.

[ASIAN 241 China's Literary Heritage: An Introduction in Translation @ # (IV) (LA)
Fall or spring. 3 credits. M. Hatch.
For description, see MUSIC 245.

[ASIAN 249] Peddlers, Pirates, and Prostitutes: Subaltern Histories of Southeast Asia, 1800-1900 (also HIST 249/648) @ # (III) (HA)
E. Tagliacozzo.
For description, see HIST 249.

[ASIAN 250] Introduction to Asian Religions (also RELST 250) @ # (IV) (HA)
Spring. 3 credits. D. Boucher.
This course explores a range of religious traditions in South Asia (Pakistan, India, and Sri Lanka) and East Asia (China and Japan) including Hinduism, Buddhism (South and East Asian), Confucianism, Daoism, and Shinto. We concentrate on these religions in traditional times in order to understand better the historical foundations that have influenced much of what these cultures are today. The course format includes lectures and discussion sections.

[ASIAN 277] Meditation in Indian Culture (also RELST 277) @ # (IV) (CA)
Spring. 3 credits. D. Gold.
This course 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.

[ASIAN 284] Southeast Asia in the World System: Capitalism and Incorporation, 1500-1500 (also HIST 284) @ # (III)
E. Tagliacozzo.
For description, see HIST 284.

[ASIAN 293] History of China up to Modern Times (also HIST 293) @ # (III) (HA)
Fall. 4 credits. C. Peterson.
For description, see HIST 293.

[ASIAN 294] History of China in Modern Times (also HIST 294) @ # (III) (HA)
Spring. 4 credits. Staff.
For description, see HIST 294.

[ASIAN 298] The U.S.-Vietnam War (also HIST 298) @ (III) (HA)

[ASIAN 299] Buddhism (also RELST 299) @ # (IV) (CA)
D. Boucher.

[ASIAN 301] Schools of Thought—Ancient China @ (IV)
Fall. 4 credits. R. McNeal.
This course introduces students to early Chinese thought through readings in translation from classical works on moral and political philosophy. We address critically the traditional conception of the Six Schools of thought in ancient China, including the Taoists, Confucians, and Legalists. We examine newly discovered materials and recent research that helps clarify the relationships among early intellectual traditions and the social and intellectual world from which they emerged.

[ASIAN 302] Art of War in Ancient China @ # (IV) (HA)
R. McNeal.

[ASIAN 306] Zen Buddhism (also RELST 306) @ # (IV) (KCM)
Spring. 4 credits. Prerequisites: any course at the university level in Buddhism or Asian Studies (Religious Studies) 250, or consent of the instructor. Course limited to 15 students. Graduate students can take this course for credit and sign up for an additional credit hour for an extra session. Not offered 2004–2005. J. M. Law.

[ASIAN 307] Indian Dance (also DANCE 307)
Fall. 0–3 credits. Satisfies @ (IV) (LA) if taken for 3 credits. D. Bor.
For description, see DANCE 307.

[ASIAN 312] Intellectuals in Early Modern Korea @ # (IV) (HA)
Fall. 4 credits. Prerequisite: one course on modern Japan or Korea. Not offered 2004–2005. M. Shin.

[ASIAN 328] Construction of Modern Japan (also HIST 328) @ (III)
J. V. Koschmann.
For description, see HIST 328.

[ASIAN 330] Living Tones: Korean Music in a Global Context (also MUSIC 387)
Fall. 4 credits. J. H. Kim.
This course explores many facets of traditional Korean music, including its instruments, composition, and influence on culture. Weekly sessions include live demonstrations of compositions for the traditional komungo (izither) and drum, discuss shamanic, Buddhist and Confucian influences on Korean musical performance, and consider how elements of Korean music have been fused in world music and other contemporary genres.

[ASIAN 347] Tantric Traditions (also RELST 347) @ (IV) (CA)
D. Gold.

[ASIAN 348] Indian Devotional Poetry (also RELST 348) @ # (IV) (LA)
D. Gold.

[ASIAN 351] Indian Religious Worlds (also RELST 351) @ (IV) (CA)
D. Gold.

[ASIAN 354] Indian Buddhism (also RELST 354) @ # (IV) (HA)
Fall. 4 credits. D. Boucher.
This course surveys Buddhism in South Asia from its origins in northeast India to its migrations throughout the Indian subcontinent, including the Mahayana and Vajrayana traditions. We also explore the way two very different forms of Indian Buddhism became entrenched in the adjacent regions of Sri Lanka and Nepal.

[ASIAN 355] Japanese Religions (also RELST 355) @ (IV) (CA)
J. M. Law.

[ASIAN 356] Theravada Buddhism (also RELST 356) @ (IV) (CA)
A. Blackburn.

[ASIAN 357] Chinese Religions (also RELST 357) @ # (IV) (CA)
D. Boucher.

[ASIAN 359] Japanese Buddhism: Texts in Context (also RELST 359) @ # (IV) (HA)
J. M. Law.

[ASIAN 373] Twentieth-Century Chinese Literature @ (IV) (LA)
E. Gunn.

[ASIAN 374] Chinese Narrative Literature (also COM L 376) @ # (IV) (LA)
Spring. 4 credits. E. Gunn, D. X. Warner. Selected works in classical Chinese fiction are read in translation. Major novels, such as Tale of Genji, puppet theater, Ainu autobiography, and films and comic books dealing with themes of nuclear warfare are emphasized.
ARTS AND SCIENCES - 2004-2005

ASIANTH39 Southeast Asian Literature in Translation
Fall. 4 credits. L. Paterson.

[ASIANTH380] Vietnamese Literature in Translation @ (IV) (LA)
Fall. 4 credits. Not offered 2004-2005.
K. Taylor.

[ASIANTH381] Introduction to the Arts of Japan (also ART H 384) @ (IV) (LA)
Fall. 4 credits. Not offered 2004-2005.
A. Pan.

For description, see ART H 384.

[ASIANTH383] Introduction to the Arts of China (also ART H 380 and ARKEO 380) @ (IV) (LA)
Fall. 4 credits. A. Pan.

For description, see ART H 380.

[ASIANTH384] Representation and Meaning in Chinese Painting (also ART H 385) @ (IV) (CA)
A. Pan.

For description, see ART H 385.

[ASIANTH385] History of Vietnam (also HIST 386/688) @ (IV) (HA)
K. Taylor.

[ASIANTH386] Literature and Film of South Asia (also COM L 386)
Fall. 4 credits. A. Banerjee.

For description, see COM L 386.

[ASIANTH388] Theorizing Gender and Race in Asian Histories and Literatures (also ASIAN 388 and COM L 389/689) @ (IV) (CA)
Fall. 4 credits. Not offered 2004-2005.
N. Sakai.

[ASIANTH390] The Sanskrit Epics (also CLASS 390) @ (IV) (LA)
C. Minkowski.

[ASIANTH392] Divination Sciences in Antiquity (also CLASS 392 and NES 392)
Fall. 4 credits. C. Minkowski.

An historical survey of the divinatory systems in Greek, Sanskrit, and Arabic, with special focus on celestial divination and astrology. Some attention is paid to early knowledge systems—Egyptian, Babylonian, Indian, and Chinese—and to the later career of divination in medieval Europe and Asia. Topics include the relevance of early cosmologies to the practice of divination; philosophical and theological arguments for and against divination; the theory and practice of universal, genetiaic, and catarhatic astrology; the social worlds of astrologers and their clients; and the study of divination as a problem in the history and philosophy of science.

[ASIANTH394] The House and the World: Architecture of Asia (also ART H 395) @ (IV) (HA)
Spring. 4 credits. K. McGowan.

For description, see ART H 395.

[ASIANTH395] Classical Indian Philosophical Systems (also CLASS 395 and RELST 395) @ (IV) (KCM)
Spring. 4 credits. Prerequisite: some background in philosophy or in classical culture. Not offered 2004-2005.
C. Minkowski.

[ASIANTH396] Southeast Asian History from the Eighteenth Century (also HIST 396) @ (IV) (KCM)
Spring. 4 credits. T. Loos.

For description, see HIST 396.

[ASIANTH397] Promodern Southeast Asia (also HIST 397)
Fall. 4 credits. T. Taglialozzo.

For description, see HIST 397.

[ASIANTH398] Archipelago: The Worlds of Indonesia (also HIST 410)
Spring. 4 credits. E. Taglialozzo.

For description, see HIST 410.

[ASIANTH399] Chinese Film (also VISST 410) @ (IV) (LA)
E. Gunn.

[ASIANTH411] History of the Japanese Language (also LING 411 and JAPAN 410) @ (III) (HA)
Fall. 4 credits. Not offered 2004-2005.
J. Whitman.

For description, see LING 411.

[ASIANTH412] Linguistic Structure of Japanese (also LING 412) (III) (KCM)
J. Whitman.

For description, see LING 412.

[ASIANTH413] Religion and Politics in Southeast Asia (also ANTHR 413) @ (III) (CA)
Spring. 4 credits. A. Willford.

For description, see ANTHR 413.

[ASIANTH414] Second Language Acquisition I (also LING 414) (III) (KCM)
Fall. 4 credits. Y. Shirai.

For description, see LING 414.

[ASIANTH415] Virtual Orientalisms (also S HUM 415 and COM L 418)
B. de Bary.

[ASIANTH416] Gender and Sexuality in Southeast Asian History (also HIST 416 and FGSS 416) @ (III) (CA)
Spring. 4 credits. T. Loos.

For description, see HIST 416.

[ASIANTH417] Second Language Acquisition II (also LING 415) (III) (KCM)
Spring. 4 credits. Y. Shirai.

For description, see LING 415.

[ASIANTH419] The Classical in Colonial Asia (also S HUM 410)
Fall. 4 credits. Limited to fifteen students.
A. Blackburn.

For description, see S HUM 410.

[ASIANTH421] Religious Reflections on the Human Body (also RELST 422) (IV) (KCM)
Spring. 4 credits. Prerequisites: one course in Religious Studies or permission of instructor. Not offered 2004-2005.
J. M. Law.

[ASIANTH425] Theories of Civilization (also HIST 494) @ (III or IV) (IV)
K. Taylor.

[ASIANTH430] Structure of Korean (also LING 430 and KOREA 430) (III)
J. Whitman.

For description, see LING 430.

ASIANTH436 Topics in Indian Film
Spring. 4 credits. No knowledge of an Indian language is needed. D. Gold. The course 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.

[ASIANTH438] Monks, Texts, and Relics: Transnational Buddhism in Asia (also ASIAN 638 and RELST 438) (IV) (CA)
Spring. 4 credits. Prerequisites: one previous 300-level or above course in ASIAN or RELST or permission of the instructor. Not offered 2004-2005.
A. Blackburn.

[ASIANTH439] Japanese Politics (also GOVT 439) @ (III) (SBA)
Fall. 4 credits. R. Weiner.

For description, see GOVT 439.

[ASIANTH441] Mahayana Buddhism (also RELST 441) @ (IV) (CA)
Spring. 4 credits. D. Boucher.

This course explores the origins and early developments of a movement in Indian Buddhism known as the Mahayana, focusing on a small slice of this movement's voluminous literature. Topics of discussion include the career of the bodhisattva, the lay-monk distinction, attitudes of Mahayanaists towards women and other Buddhists, and the development of Buddhist utopias and transcendent Buddh.

[ASIANTH445] Japanese Imperialism in East Asia @ (IV) (HA)
Fall. 4 credits. Prerequisite: at least one previous course on modern East Asia. Limited to 15 students. Not offered 2004-2005.
M. Shin.

[ASIANTH449] History and Methods of the Academic Study of Religion (also RELST 449) @ (IV) (KCM)
M. M. Law.

[ASIANTH450] Crime and Diaspora in Southeast Asian History (also HIST 451) @ (III)
Fall. 4 credits. Not offered 2004-2005.
E. Taglialozzo.

For description, see HIST 451.

[ASIANTH460] Indian Meditation Texts (also RELST 460) @ (IV) (KCM)
Fall. 4 credits. D. Gold.

This course draws on approaches from literary criticism, anthropology, and religious studies to explore texts that record religious experience. Readings are drawn from classical meditation manuals of Hinduism and Buddhism and later yogic and devotional texts. No knowledge of Indian languages is required.
[ASIAN 462] Religion, Colonialism, and Nationalism in South and Southeast Asia (also ASIAN 662 and RELST 462) (IV) (CA)
Spring. 4 credits. Prerequisites: one previous course in ASIAN, RELST, HIST. ANTHH at 300 level or above or permission of instructor. Not offered 2004–2005. A. Blackburn.

[ASIAN 476] Senior Seminar: Comparative Colonial Law and Society (also HIST 476 and FGSS 476) @ (III)
For description, see HIST 476.1

[ASIAN 479] Art of the T’ang Dynasty (also ART H 481) # @ (IV)
For description, see ART H 481.1

ASIAN 481 Translation and Cultural Differences (also S HUM 408) @ (IV) (KCM)
Fall. 4 credits. N. Sakai.
For description, see S HUM 408.

[ASIAN 482] Seminar: Gender Adjudicated (also HIST 480) # @ (III)
For description, see HIST 480.1

ASIAN 483 Internationalism, Nationalism, and Modern Japanese Discursive Space @ (III) (KCM)
Spring. 3 credits. N. Sakai.
In the late nineteenth and early twentieth centuries, nation-states formed in Britain, France, Japan, Germany, and the United States sought to become imperial powers; and “internationalism” virtually collapsed. Focusing on Japanese examples, but not excluding other cases, we study modern national subjectivity with a view to the problems of ethnicity, colonialism, sexism, historical memory, post-coloniality, and academic knowledge.

[ASIAN 486] Ritual and Performance in Japanese Religions (also RELST 486) (IV) (CA)
Spring. 4 credits. Class size limited to 12. Prerequisites: instructor consent for undergraduates. Ability to read Japanese is not required, but there are optional readings in Japanese. Graduate students may sign up for this as a graduate-level course. Not offered 2004–2005. J. M. Law.

ASIAN 487 Vedanta Among the Shastras
Spring. 4 credits. Intended primarily for seniors/majors and graduate students. Background required. Admission by permission of the instructor. C. Minkowski.
Seminar on the doctrinal, institutional, and social history of Vedanta. Emphasis on the constitution of Advaita Vedanta as a “knowledge system” in relation to other Sanskrit knowledge systems or shastras, especially Mimamsa, Nyaya, Samkhya, and Vyakarana. Topics include Vedanta’s main textual modes and practices; its recognized foundations (Upanishads, Brahmasutras) and unacknowledged influences (Yogachara, Shahabadwals); its leaders, outletters, and rivals; and the affiliations of Vedantins with various ritual schools, philosophical positions, and social movements.

ASIAN 491 Art and Collecting: East and West (also ART H 490) @ # (IV) (CA)
Fall. 4 credits. K. McGowan.
For description, see ART H 490.

ASIAN 492 Undergraduate Seminar in Medieval Chinese History (also HIST 492) # @ (III) (HA)
Fall. 4 credits. Prerequisites: ASIAN 293/ HIST 293, HIST 360, or permission of instructor C. Peterson.
For description, see HIST 492.

ASIAN 493 Problems in Modern Chinese History (also HIST 493/693) @ (III) (HA)
Fall. 4 credits. Prerequisite: permission of instructor. S. Cochran.
For description, see HIST 493.

ASIAN 496 Tokugawa Literature and Thought # @ (IV)
Spring. 4 credits. N. Sakai.
An introduction (in English translation) to literary, theatrical, and intellectual works of the Tokugawa period (1600–1868). We examine the characteristics of the literary and theatrical works of the Tokugawa Japan and read the philosophical and philological works on the classics by writers such as Ognyu Sorai and Motoori Norinaga to discuss the issues of literary modernity.

ASIAN 499 Problems in Modern Chinese History (also HIST 499/699) @ (III) (HA)
Spring. 4 credits. Prerequisite: permission of instructor. S. Cochran.
For description, see HIST 499.

ASIAN 507 The Occidental Tourist (also HIST 207/507 and ASIAN 206) @ (III)
Fall. 4 credits. T. Loos.
For description, see HIST 207.

ASIAN 580 Problems in Asian Art: Body, Memory, and Architecture (also ART H 580)
Spring. 4 credits. K. McGowan.
For description, see ART H 580.

Asia—Graduate Seminars
For complete descriptions of courses numbered 600 or above, consult the director of graduate studies.

[ASIAN 601] Southeast Asia Area Seminar: Thailand (also HIST 487/687)

[ASIAN 602] Southeast Asia Seminar

ASIAN 603 Southeast Asia Topical Seminar: Sociology of Natural Resources and Development (also D S 511, 607)
Fall. 4 credits. P. Gellert.
For description, see R SOC 607.

[ASIAN 604] Southeast Asia Topical Seminar

[ASIAN 605-606] Master of Arts Seminar in Asian Studies

[ASIAN 610] SLA and the Asian Languages (also LING 609)
For description, see LING 609.

ASIAN 612 Japanese Bibliography and Methodology
Fall. 1 credit. Prerequisite: permission of instructor. Required of honors students and M.A. candidates. F. Kotas.

ASIAN 613 Southeast Asian Bibliography and Methodology
Fall. 1 credit. Prerequisite: permission of instructor. Staff.
This course is designed to instruct students in methods of identifying and locating resources for the study of Southeast Asia. Emphasis is on the practical aspects of using various types of bibliographical tools to identify both primary and secondary sources in Southeast Asian and Western languages. Electronic databases and online services as well as traditional printed resources are covered. Relevant arcana of library science is explained as necessary. Required of honors students and Master of Arts candidates. No foreign language competence is required but a reading knowledge of at least one Southeast Asian language or other Asian language (especially Chinese or Japanese) and a major European language (especially French, Spanish, or Dutch) is highly desirable.

ASIAN 616 Gender and Sexuality in Southeast Asian History (also ASIAN 416 and HIST 416/616)
Spring. 4 credits. For graduate students. T. Loos.
For description, see HIST 416.

[ASIAN 626] The Eighteenth Century and the Emergence of Literary Modernity

[ASIAN 638] Monks, Texts, and Relics: Transnational Buddhism in Asia (also RELST 438)
Spring. 4 credits. Prerequisites: one previous 300-level or above course in ASIAN or RELST or permission of the instructor. Not offered 2004–2005. A. Blackburn.

[ASIAN 648] Peddlers, Pirates, and Prostitutes: Subaltern Histories of Southeast Asia, 1800–1900 (also HIST 249/648)
For description, see HIST 648.

[ASIAN 650] Seminar in Asian Religions

[ASIAN 651] Crime and Diaspora in Southeast Asian History (also HIST 451/650)
For description, see HIST 650.

[ASIAN 654] Indian Buddhism (also ASIAN 354, RELST 354/654)
Fall. 4 credits. Graduate students attend ASIAN 354 and arrange additional meetings with instructor. D. Boucher.
For description, see ASIAN 354.
Honors Courses

ASIAN 401 Asian Studies Honors Course
Fall or spring. 4 credits. Intended for seniors who have been admitted to the honors program. Staff.
Supervised reading and research on the problem selected for honors work.

ASIAN 402 Asian Studies Honors: Senior Essay
Fall or spring. 4 credits. Prerequisite: admission to the honors program. Staff.
The student, under faculty direction, prepares an honors essay.

ASIAN 403-404 Asian Studies Supervised Reading
Fall, spring, or both. 1–4 credits. Prerequisite: permission of instructor. Open to majors and other qualified students.
Intensive reading under the direction of a member of the staff.

Bengali

BENG 121-122 Elementary Bengali
Fall, 121; spring, 122. 4 credits each term. BENG 122 provides language qualification. Prerequisite: for BENG 122, BENG 121 or examination. D. Mookerjee-Leonard.
The emphasis is on basic grammar, speaking, and comprehension skills; Bengali script is also introduced.

BENG 201-202 Intermediate Reading and Conversation
Fall, 201; spring, 202. 4 credits each term. BENG 201 provides language proficiency and satisfies Option 1. Prerequisites: for BENG 201, BENG 122 or examination; for BENG 202, BENG 201 or examination. D. Mookerjee-Leonard.
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 203-204 Intermediate Bengali Composition and Conversation
Fall, 203; spring, 204. 2 credits each term. BENG 204 provides language proficiency and satisfies Option 1. Prerequisites: for BENG 203, BENG 122 or examination; for BENG 204, BENG 203 or examination. D. Mookerjee-Leonard.
This course complements the verbal skills developed in BENG 201-202. Intermediate Reading and Conversation, by improving writing skills.

BENG 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. D. Mookerjee-Leonard.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

BENG 303-304 Bengali Literature I, II
Fall, 303; spring, 304. 4 credits each term. Prerequisites: BENG 203-204 or equivalent. D. Mookerjee-Leonard.
Course 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.

Burmese

Note: Contact S. Tun in Morrill Hall 405 before classes begin for placement or other testing and organizational information.

BURM 103-104 Burmese Conversation Practice
Fall, 103; spring, 104. 2 credits each term. Prerequisites: for BURM 104, BURM 103 and BURM 121. May not be taken alone.
Must be taken simultaneously with BURM 121-122. Satisfactory completion of BURM 104-122 fulfills the qualification portion of the language requirement. S. Tun.
Additional drills, practice, and extension of materials covered in BURM 121 and 122. These courses are designed to be attended simultaneously with BURM 121-122 respectively, allowing students to obtain qualification within a year.

BURM 121-122 Elementary Burmese
Fall, 121; spring, 122. 4 credits each term. BURM 122 provides language qualification. BURM 121 is prerequisite for BURM 122. May be taken alone or simultaneously with BURM 103-104. Satisfactory completion of BURM 104/122 fulfills the qualification portion of the language requirement. S. Tun.
A thorough grounding is given in all language skills: listening, speaking, reading, and writing.

BURM 123 Continuing Burmese
Fall. 4 credits. Provides language qualification. Prerequisite: BURM 122. Satisfactory completion of BURM 123 fulfills the qualification portion of the language requirement. S. Tun.
Continuing instruction in conversational and reading skills to prepare students for 200-level courses.

BURM 201-202 Intermediate Burmese Reading &
Fall, 201; spring, 202. 4 credits each term. BURM 201 provides language proficiency and satisfies Option 1. Prerequisites: for BURM 201, BURM 122 or examination; for BURM 202, BURM 121. May not be taken alone or simultaneously with BURM 121-122. Satisfactory completion of BURM 104-122 fulfills the qualification portion of the language requirement. S. Tun.
Continuing instruction in Burmese, with emphasis on consolidating and extending conversational skills, and on extending reading ability.

BURM 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. D. Mookerjee-Leonard.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

BURM 301-302 Advanced Burmese
Fall, 301; spring, 302. 4 credits each term. Prerequisites: for BURM 301, BURM 202 or permission of instructor; for BURM 302, BURM 301. S. Tun.
Continuing instruction on conversational and literary skills, but with special emphasis on reading. Students encounter various genres and styles of written Burmese. Readings include articles on current events, and either several short stories or a novel. Focus is on developing reading skills, particularly on vocabulary development, consolidating and expanding grammar, and appreciating stylistic and cultural differences.
for this course, students missing the first 2 meetings without a university excuse are dropped so others may register. F. Lee-Mehta.

This course is 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 111-112 Elementary Cantonese**

111, fall; 112, spring. 4 credits each term. Prerequisite: For CHIN 111, must have permission of instructor. For CHIN 112, completion of CHIN 111, or equivalent. Students with Mandarin background should enroll in CHIN 112. CHIN 112 provides language qualification. H. Huang.

CHIN 111 is a course for beginners with no or very limited Chinese/Cantonese language background from heritage or previous formal training. CHIN 111-112 gives comprehensive training in oral/aural reading/writing in Cantonese spoken and used in Canton and Hong Kong. CHIN 111 focuses on oral- and aural-skills training than on reading and writing Cantonese characters. CHIN 112 covers more training on reading and writing Cantonese characters than does CHIN 111.

**CHIN 201-202 Intermediate Standard Chinese (Mandarin)**

201, fall or summer; 202, spring or summer. 4 credits each term. CHIN 201 provides language proficiency and satisfies Option 1. Prerequisites: For CHIN 201, CHIN 102 with a grade of C+ or above or equivalent for CHIN 202, CHIN 201 or equivalent. 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 209-210 Intermediate Reading and Writing**

209; fall; 210, spring. 4 credits each term. CHIN 209 provides language proficiency and satisfies Option 1. Prerequisites: for CHIN 209, CHIN 110 or equivalent, CHIN 210, CHIN 209. After completing 210, students may take only 400-level courses in Chinese. 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 211-212 Intermediate Cantonese**

211, fall; 212, spring. 4 credits each term. CHIN 211 provides language proficiency and satisfies Option 1. Prerequisites: for 211, permission of instructor and completion of CHIN 112 or students who have elementary conversational skills in Cantonese from heritage but have very limited formal training in Cantonese character reading and writing. For 212, CHIN 211 or equivalent. H. Huang.

A course that gives comprehensive training in oral and written Cantonese at a higher level than CHIN 111-112. Oral training covers conversational Cantonese expression on daily life topics. Written training includes reading aloud and writing Cantonese characters as well as simple composition writing skills in Chinese characters.

**CHIN 213-214 Intermediate Reading and Writing for Cantonese Speakers**

Fall, spring. 4 credits each term. CHIN 213 provides language proficiency and satisfies Option 1. Prerequisite for CHIN 213: Cantonese speakers who have no major problems in oral communication in Cantonese and have very basic ability in reading and writing Chinese characters. Prerequisite for 214: 213 or equivalent. H. Huang.

A course intended primarily for students who are Cantonese speakers from heritage or previous formal training and who have very basic ability in Chinese character reading and writing. The training focuses on reading and writing Cantonese characters as well as composition/essay writing in Cantonese characters. Students also learn some basic knowledge of Cantonese oral and written translation vs. English or Mandarin.

**CHIN 301-302 High Intermediate Chinese**

301, fall; 302, spring. 4 credits each term. Satisfies Option 1. Prerequisites: for CHIN 301, CHIN 202 or equivalent; for CHIN 302, CHIN 301, F. Lee-Mehta.

Continuing instruction in spoken Chinese and in various genres and styles of written Chinese.

**CHIN 304 Advanced Mandarin Conversation**

Spring. 1 credit. Prerequisite: CHIN 202, CHIN 215, CHIN 301, or permission of instructor. Limited to 10 students. Staff.

Offers a wonderful speaking and listening opportunity to students who wish to maintain/increase their language proficiency by engaging in guided discussions of various topics.

**CHIN 411-412 Advanced Chinese**

Fiction, Reportage, Current Events @ 411, fall; 412, spring. 4 credits each term. Prerequisites: for CHIN 411, CHIN 302 or equivalent; for CHIN 412, CHIN 411 and permission of instructor required. Q. Teng.

Reading, discussion, and composition at advanced levels.

**CHIN 425 Special Topics**

Spring. 4 credits. Prerequisite: permission of instructor. Staff.

## 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 http://lrc.cornell.edu/falcon
This is a full-time program and full academic work on spoken and written Chinese from CHIN 160 Introductory Intensive course with a grade of at least B are normally eligible to enroll in CHIN 201. Introduction to spoken and written Mandarin.

This course sequence is meant for those students who have had very little or no exposure to Hindi-Urdu. It is designed to enable such students to read, write, and converse in the language with confidence and enjoyment. Hindi and Urdu are sister languages and share an identical grammar and elementary vocabulary. The language presented in the course is colloquial. The Hindi script is taught first and the Urdu script is taught as an additional course in the spring semester. Students who have some experience of Hindi-Urdu or a closely related language are suited for HINDI 109-110 and should check with the instructor.

HINDI 109-110 Accelerated Elementary Hindi-Urdu
109, fall, 110, spring, 3 credits each term. HINDI 110 provides language qualification. Prerequisite for HINDI 110: HINDI 109 or equivalent. A. Fathi. An entry-level sequence for students with some prior exposure to Hindi-Urdu or a closely related language. This course sequence provides a thorough grounding in all the language skills: listening, speaking, reading, and writing. Completion of this sequence, including satisfactory performance on an examination given at the end of HINDI 110, constitutes a level of performance equal to that of the 101-102 sequence, and is thus considered to fulfill qualification for the language requirement plus eligibility for 200-level Hindi-Urdu courses. Check with instructor regarding placement.

HINDI 201-202 Intermediate Hindi Reading @
201, fall, 202, spring, 3 credits each term. HINDI 201 provides language proficiency and satisfies Option 1. Prerequisites: for HINDI 201, HINDI 102. For HINDI 202, HINDI 201 or permission of instructor. A. Fathi.

[HINDI 203-204 Intermediate Composition and Conversation @
203, fall, 204, spring, 3 credits each term. HINDI 203 provides language proficiency and satisfies Option 1. Prerequisites: for HINDI 203, HINDI 102; for HINDI 204, HINDI 203 or permission of instructor. Not offered 2004-2005. A. Fathi. Taught on a specialized basis to address particular student needs. Times arranged with instructor.

HINDI 301-302 Advanced Readings in Hindi Literature
301, fall, 302, spring, 4 credits each term. Prerequisites: for HINDI 301, HINDI 201; for HINDI 302, HINDI 301 or equivalent. A. Fathi. Selected readings in modern Hindi literature.

Indonesian
For students who have completed INDO 121-122-123 or its equivalent there is the option of a one-semester program in Malang, East Java. During the junior year. The program combines a variety of cultural and artistic options with area course work and advanced language study. Complete information is available through Cornell Abroad. Students who have completed a minimum of 18 credits or the equivalent are eligible to apply for a summer program in the Advanced Indonesian Abroad Program. Further
INDO 121-122 Elementary Indonesian
121, fall; 122, spring. 4 credits each term. Prerequisite: for INDO 122, INDO 121. T. Savella and staff.
A thorough grounding is given in basic speaking and listening skills with an introduction to reading.

INDO 123 Continuing Indonesian
Fall. 4 credits. Provides language qualification. Prerequisite: INDO 122 or equivalent. T. Savella and staff.
Improves speaking skills, such as fluency and pronunciation, focusing on verbal communication skills, offers a wide range of readings and sharpens listening skills.

[INDO 203-204 Intermediate Composition and Conversation @
203, fall; 204, spring. 3 credits each term. INDO 203 provides language proficiency and satisfies Option 1. Prerequisites: for INDO 203, INDO 123; for INDO 204, INDO 203 or permission of instructor. Not offered 2004-2005. T. Savella and staff.]

INDO 205-206 Intermediate Indonesian @
205, fall; 206, spring. 3 credits each term. INDO 205 provides language proficiency and satisfies Option 1. Prerequisites: for INDO 205, INDO 123 or equivalent; for INDO 206: INDO 205 or equivalent. T. Savella and staff.
This course develops all four skills: reading, writing, speaking, and comprehension.

[INDO 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. Times arranged with instructor. Not offered 2004-2005. T. Savella and staff.]
INDO 305-306 Directed Individual Study
305, fall; 306, spring. 2-4 credits. Prerequisites: INDO 301-302 and 303-304 or equivalent knowledge of Indonesian or Malay. T. Savella and staff.
A practical language course on an advanced level in which the students read materials in their field of interest, write reports, and meet with the instructor for two hours a week for two credits and twice a week for four credits.

Japanese

JAPAN 101-102 Elementary Japanese
101, fall; 102, spring. 6 credits each term. JAPAN 102 provides language qualification. Prerequisite for JAPAN 102: JAPAN 101 or placement by the instructor during registration period. Intended for beginners or for those who have been placed in the course by examination. You must enroll in lecture and 1 section. R. Sukle, Y. Nakamishi, and staff.
A thorough grounding in all four language skills—speaking, hearing, reading, writing—at the beginning level, but with a special emphasis on oral communication and actual use of the language in social context. Homework for the course is largely work on the skill aspects of language through practice on the Internet, with CDs, or with tapes. The lecture provides explanation, analysis, and cultural background necessary for successful interaction with Japanese people. The sections are conducted entirely in Japanese. Materials covered are not the same as for JAPAN 141-142.

JAPAN 141-142 Beginning Japanese at a Moderate Pace
141, fall; 142, spring. 4 credits each term. Prerequisite for JAPAN 142: JAPAN 141 or placement by instructor during registration period. Y. Kawasaki and staff.
Beginning-level training in listening, speaking, reading, and writing, with more emphasis on written skills than JAPAN 101-102. Classroom activities focus on oral communication skills. Homework 1 hour per week. Fewer credits and fewer class contact hours than JAPAN 101-102; the course meets five hours per week (MTWRF). Materials covered are not the same materials as JAPAN 101-102.

JAPAN 201-202 Intermediate Japanese Conversation @
201, fall and summer; 202, spring and summer. 4 credits each term. JAPAN 201 provides language proficiency and satisfies Option 1. Prerequisites: for JAPAN 201, JAPAN 102 or placement by the instructor during registration period; for JAPAN 202, JAPAN 201 and 203 or placement by the instructor during registration. You must enroll in lecture and 1 section. Students enrolled in JAPAN 201 are strongly urged to enroll concurrently in JAPAN 203. Y. Katagiri.
This course is for students with an elementary level of Japanese to continue study of the language and acquire widely applicable oral proficiency. Sections are conducted entirely in Japanese to develop listening comprehension and speaking ability through practical situational practices. Lectures give versatile knowledge of essential structural patterns systematically, with audiovisual aids (e.g. Japanese TV) to demonstrate use in actual situations.

JAPAN 203-204 Intermediate Japanese Reading 1 @
203, fall; 204, spring. 2 or 3 credits each term. JAPAN 203 provides language proficiency and satisfies Option 1. Prerequisites: for JAPAN 203, JAPAN 102, or placement by the instructor during registration; for JAPAN 204, JAPAN 203 or placement by the instructor during registration. N. Larson.
Reading of elementary texts emphasizing practical materials, with development of writing skills.

JAPAN 241-242 Intermediate Japanese at a Moderate Pace
241, fall; 242, spring. 4 credits each term. JAPAN 241 provides language proficiency and satisfies Option 1. Prerequisites: for JAPAN 241, JAPAN 142 or placement by instructor during registration period; for JAPAN 242, JAPAN 241 or placement by instructor. Y. Kawasaki.
Training in writing, speaking, reading, and writing for those students who have acquired a basic beginning-level command.

JAPAN 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. Staff.
Taught on a specialized basis to address particular student needs. Times arranged with instructor.

JAPAN 301-302 Communicative Competence @
301, fall; 302, spring. 3 credits each term. JAPAN 301 satisfies Option 1. Prerequisites: for JAPAN 301, JAPAN 202 and placement by the instructor during registration; for JAPAN 302, JAPAN 301 or placement by the instructor during registration. Y. Kawasaki and staff.
This is a course for students who have learned basic Japanese grammar and oral skills and would like to use the language for natural conversation and effective oral communication. The course is intended to 1) expand vocabulary for daily life use; 2) brush up on knowledge of basic grammar for fluency; and 3) develop communicative skills for varied situations.

JAPAN 303-304 Intermediate Japanese Reading II @
303, fall; 304, spring. 4 credits each term. JAPAN 303 satisfies Option 1. Prerequisites: for JAPAN 303, JAPAN 202 or placement by the instructor during registration; for JAPAN 304, JAPAN 303 or placement by the instructor during registration. Staff.
Reading of selected modern texts with emphasis on expository style.

JAPAN 401-402 Oral Narration and Public Speaking
401, fall; 402, spring. 2 credits each term. Prerequisites: for JAPAN 401, JAPAN 302 or placement by the instructor during registration; for JAPAN 402, JAPAN 401 or placement by the instructor during registration. Y. Katagiri.
An advanced course to develop skills in oral delivery in formal settings. Students increase vocabulary and patterns used in public occasions, e.g., class presentations, speeches, discussions, interviews and debates. Fluency and listening comprehension are emphasized. Also for those interested in academic settings, e.g., research students or seminar participants. Conducted entirely in Japanese, using Japanese audiovisual and written materials.

JAPAN 403-404 Advanced Japanese Reading @
403, fall; 404, spring. 4 credits each term. Prerequisite: JAPAN 401 or permission of instructor.

Section I: Area of Humanities. Cannot be used for distribution. Reading of selected modern texts. K. Selden.

Section II: Area of Economics and Social Science. Cannot be used for distribution. Y. Kawasaki. Reading of selected modern texts with emphasis on expository style.

JAPAN 410 History of the Japanese Language (also LING 411 and ASIAN 411) @ (III) [HA]
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2004-2005. J. Whitman.

JAPAN 421-422 Directed Readings
421, fall; 422, spring. 1-4 credits. Limited to advanced students. Prerequisite: placement by the instructor during registration. K. Selden.
Topics are selected on the basis of student needs.
Japanese FALCON (Fall/year Asian Language Concentration)

Director: R. Sukle, 388 Rockefeller Hall; Program Coordinator, 388 Rockefeller Hall; 255-6457, e-mail: falcon@cornell.edu or http://lrc.cornell.edu/falcon.

There are three small interactive classes per day conducted entirely in Japanese and one lecture conducted in English and Japanese. The interactive classes are conducted by experienced and highly trained teachers, the lecture is conducted by an expert in Japanese language structure. Two one-hour sessions in the language lab are required daily. Additional preparation time in the language lab of up to 3 hours is necessary in the evenings. Exposure to the language exceeds that of even students living and studying in Japan, providing over 1,800 hours of exposure throughout the full-year program. The extensive exposure and intensive work on the language allows students to develop a level of fluency, accuracy, and control of the language not achieved in any other type of academic settings. The course is designed to develop "copability" in the students by bringing them up to the level where they will be able to successfully make further progress in the language on their own even if they do not have further formal instruction. The intensive nature of the program allows graduate students to complete their language work in minimal time and undergraduates, including freshmen, to achieve levels of Japanese that are far beyond what is normally achieved in a four-year program, provided they continue their study of Japanese after FALCON.

JAPAN 160 Introductory Intensive Japanese (FALCON)

Summer only, 8 credits. Satisfies language qualification. R. Sukle and staff.

This is the first term of the FALCON Program. It is a full-time, intensive, nine-week course that begins at the absolute beginning level, in speaking as well as rudimentary reading and writing. Formal application must be made to the program, but admission is open to all students, not just those planning to take the full-year program. Students completing this course and planning to continue at Cornell in the fall may continue with the fall and spring terms of FALCON (JAPAN 161 and 162), or they should consult the FALCON director, Robert Sukle, at 255-0734 or rjs19@cornell.edu, about other options.

JAPAN 161-162 Intensive Japanese (FALCON) @

161, fall, 162, spring. 16 credits each term. JAPAN 161 provides language proficiency and satisfies Option 1. Prerequisites: for JAPAN 161 or JAPAN 102 at Cornell, or placement by FALCON staff prior to beginning of fall term; for JAPAN 162, JAPAN 161, or placement by FALCON staff prior to beginning of spring term. Students must apply formally to program (see above); application open to all Cornell students and students from other institutions. R. Sukle and staff.

Work on spoken and written Japanese from an intermediate level to an advanced level. This is a full-time program and full academic load; the demands of the program do not normally permit students to take other courses simultaneously. With a sequence of 160-161-162, in only one calendar year a student can complete as much Japanese as would be contained 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.

Literature in Japanese

JPLIT 406 Introduction to Classical Japanese @

Fall. 4 credits. Provides language proficiency and satisfies Option 1. Prerequisite: permission of instructor. K. Selden.

This course is an introduction to the fundamental grammar and vocabulary of classical Japanese.

JPLIT 408 Readings in Classical Japanese @

Spring. 4 credits. Provides language proficiency and satisfies Option 1. Prerequisite: JPLIT 406 or permission of instructor. K. Selden.

This course is intended for students who have completed the JAPAN 403/404 sequence or the equivalent. Readings of excerpts and complete brief pieces from representative premodern Japanese literature mostly with the use of standard modern annotated editions. Different selections and themes are introduced each year.

JPLIT 421-422 Directed Readings

421, fall; 422, spring. 2-4 credits. Prerequisite: for JPLIT 421, JAPAN 404 or equivalent; for JPLIT 422, JAPAN 421 or equivalent. Staff.

Students choose a faculty member to oversee this independent study. The student and the faculty member work together to develop class readings.

JPLIT 613 Seminar in Tokugawa Culture and Thought

Spring. 2-4 credits. Prerequisite: permission of instructor. Not offered 2004–2005. N. Sakai.

JPLIT 614 Seminar in Modern Japanese Literature: Historicizing the Postmodern (also COM L 695)

Spring. 4 credits. Prerequisite: permission of instructor. B. de Bary.

The course focuses on close reading of texts by theorists most closely associated with postmodern thought, as well as contemporary and later texts that criticize, contextualize, and historicize their arguments. Emphasis will be given to attempts to redefine the "political," in relation to language, in postmodern thought (especially the writings of Jacques Derrida), as well as to more recent critiques of that effort, by postcolonial critics and others. Students wishing to do a final project investigating postmodern movements from the perspective of non-English language writings, especially non-Western languages, are encouraged to do so.

JPLIT 617 Modern Japanese Philosophy


JPLIT 618 Japanese Philosophical Discourse II


JPLIT 624 Advanced Readings in Modern Japanese Literature

Spring. 4 credits. Prerequisite: permission of instructor. Not offered 2004–2005. B. de Bary.

JPLIT 625 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.

JPLIT 700-701 Seminar: Reading of Historical Materials—Japanese Imperial Nationalism and Its Literature


Khmaer (Cambodian)

KHMER 121-122-123 Elementary Khmer

121, fall; 122, spring, 123 fall. 4 credits each term. Completion of KHMER 123 provides language qualification. Prerequisite: for KHMER 122, KHMER 121; or for KHMER 123, KHMER 122. Staff.

A course for beginners or those who have been placed in the course by examination. The course gives a thorough grounding in speaking and reading.

KHMER 201-202 Intermediate Khmer Reading @

201, fall; 202, spring. 3 credits each term. KHMER 203 provides language proficiency and satisfies Option 1. Prerequisites: for KHMER 201, KHMER 102; for KHMER 202, KHMER 201. Staff.

Continuing instruction in spoken and written Khmer.

[KHMER 203-204 Intermediate Composition and Conversation @

203, fall; 204, spring. 3 credits each term. KHMER 203 provides language proficiency and satisfies Option 1. Prerequisites: for KHMER 203, KHMER 102; for KHMER 204, KHMER 203. Not offered 2004–2005. Staff.]

KHMER 300 Directed Studies

Fall or spring. 1–4 credits, variable. Prerequisite: permission of instructor. Staff.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

KHMER 301-302 Advanced Khmer

301, 302, fall. 3 credits each term. Prerequisites: for KHMER 301, KHMER 202 or equivalent; for KHMER 302, KHMER 301. Staff.

Continuing instruction in spoken and written Khmer; emphasis on enlarging vocabulary, increasing reading speed, and reading various genres and styles of prose.

[KHMER 401-402 Directed Individual Study

401, fall; 402, spring. For advanced students. 2–4 credits each term. Prerequisite: permission of instructor. Not offered 2004–2005. Staff.]

Korean

KOREA 101-102 Elementary Korean

101, fall; 102, spring. 6 credits each term. KOREA 102 provides language qualification. 11. Diff/Both and staff.
Covers basics of speaking, reading, and writing. Introduces Hangul writing system and grammar.

**KOREA 109–110  Elementary Reading**

109, fall; 110, spring. 3 credits each term. **KOREA 110 provides language qualification. Prerequisite: permission of instructor. H. Diffloth and staff.**

This course is for students who have spoken some Korean at home, but whose reading and writing skills are limited or nonexistent. If in doubt about eligibility, see instructor.

**KOREA 201-202 Intermediate Korean @**

201, fall; 202, spring. 4 credits each term. **KOREA 201 provides language proficiency and satisfies Option 1. Prerequisites: for KOREA 201, KOREA 102 or permission of instructor; for KOREA 202, KOREA 201. H. Diffloth and staff.**

Covers the basics of speaking, reading, and writing at the intermediate level.

**KOREA 209-210 Intermediate Reading @**

209, fall; 210, spring. 4 credits each term. **KOREA 209 provides language proficiency and satisfies Option 1. Prerequisites: for KOREA 209, KOREA 110 or permission of instructor; for KOREA 210, KOREA 209 or permission of instructor. H. Diffloth and staff.**

An intermediate level of reading comprehension and writing course for students who have acquired basic oral proficiency. Introduces some reading and writing with Chinese characters. If in doubt about eligibility, see instructor.

**KOREA 300 Directed Studies**

Fall or spring. 1–4 credits variable. **Prerequisite: permission of instructor. H. Diffloth.**

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

**KOREA 301-302 Advanced Korean @**

301, fall; 302, spring. 4 credits each term. **KOREA 301 satisfies Option 1. Prerequisites: for KOREA 301, KOREA 202 or placement by instructor; for KOREA 302, KOREA 301 or placement by instructor. H. Diffloth and staff.**

Reading of advanced texts, including newspapers and Chinese character material, together with advanced use of the spoken language.

**KOREA 430 Structure of Korean (also LING 430 and ASIAN 430) (III) (KCM)**


See description under LING 430.

**Literature in Korean**

**KRLIT 305 Modern Korean Literature in Translation @ (IV) (LA)**

Spring. 4 credits. **Prerequisite: ASIAN 218 or its equivalent. Not offered 2004–2005. M. Shin.**

**KRLIT 405 Readings in Korean Literature @ (IV) (LA)**

Fall. 4 credits. **Prerequisite: three years of Korean language study or permission of instructor. M. Shin.**

Readings of twentieth-century Korean literature in the original. Short stories and novels are selected to provide a mixture of canonical and contemporary authors. Students also read some academic works of literary history and criticism.

**KRLIT 407 Genealogy of Korean Modernity**

Fall. 4 credits. **Prerequisites: fluency in Korean and permission of instructors. M. Ko and M. Shin.**

This course undertakes a genealogical examination of Korean modernity. The period to be covered is from the late nineteenth century to the 1940s, and the course examines newspapers, journals, and the works of major writers such as Yi Kwangsu, Kim Sowol, Han Yonggan, Sin Ch'ae-ho, and Choe Namson. This course focuses on topics including Christianity, the theory of evolution, language, pathology, sexuality, and the production of knowledge.

**KRLIT 432 Middle Korean (also LING 432) @ (IV) (LA)**

Spring. 4 credits. **Prerequisite: KOREA 301 or equivalent. Not offered 2004–2005. J. Whitman.**

For description, see LING 432.

**NEPAL 101–102  Elementary Nepali**

101, fall; 102, spring. 6 credits each term. **NEPAL 102 provides language qualification. Prerequisite: for NEPAL 102, 101 or examination. S. Oja.**

Intended for beginners. The emphasis is on reading, writing, and comprehension skills, using culturally appropriate materials and texts. Devanagari script for reading and writing is also introduced.

**NEPAL 160  Intensive Nepali**

Summer only. 6 credits. Intended for beginners. S. Oja.

Emphasis is on the spoken language, in dialogues, exercises, and conversation practice. In addition, however, special attention is given to assisting students to develop vocabularies and abilities appropriate to their unique professional needs. Reading and writing practice use both colloquial and scholarly materials in the Nepali (Devanagari) script.

**NEPAL 201–202 Intermediate Nepali Conversation @**

201, fall; 202, spring. 3 credits each term. **NEPAL 201 provides language proficiency and satisfies Option 1. Prerequisites: for NEPAL 201, NEPAL 102 or examination; for NEPAL 202, NEPAL 201 or examination. S. Oja.**

Intermediate instruction in spoken grammar and verbal comprehension skills, with special attention to developing technical vocabularies and other verbal skills appropriate to students' professional fields.

**NEPAL 203–204 Intermediate Nepali Composition @**

203, fall; 204, spring. 3 credits each term. **NEPAL 203 provides language proficiency and satisfies Option 1. Prerequisites: for NEPAL 203, NEPAL 102 or examination; for NEPAL 204, NEPAL 203 or examination. S. Oja.**

A systematic review of written grammar and reading comprehension, with special attention to the technical vocabularies, necessary writing skills, and published materials typical of advanced students' professional fields.

**NEPAL 300 Directed Studies**

Fall or spring. 1–4 credits variable. **Prerequisite: permission of instructor. S. Oja.**

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

**NEPAL 301–302 Advanced Nepali @**

301, fall; 302, spring. 3 credits each term. **Prerequisite: NEPAL 204 or permission of instructor. S. Oja.**

Reading of advanced texts, together with advanced drill on the spoken language.

**Pali**

**PALI 131–132 Elementary Pali**

131, fall; 132, spring. 3 credits each term. **This language series cannot be used to satisfy the language requirement. Not offered 2004–2005. Staff.**

**PALI 151 Accelerated Elementary Pali**

Spring. 3 credits. **Prerequisites: prior background in Sanskrit or permission of the instructor. Not offered 2004–2005. A. Blackburn.**
ARTS AND SCIENCES - 2004-2005

PALI 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: PALI 132, PALI 151 or two years of Sanskrit. A. Blackburn. Taught on a specialized basis to address particular student needs. Times arranged with instructor.

Sanskrit

[SANSK 131-132 Elementary Sanskrit (also CLASS 191-192 and LING 131-132)]

SANSK 251-252 Intermediate Sanskrit (also CLASS 251-252 and LING 251-252) @ IV
251, fall; 252, spring. 3 credits each term. SANSK 251 provides language proficiency and satisfies Option 1. Prerequisite: SANSK 132 or equivalent. Offered alternate years. C. Minkowski. Readings from the literature of classical Sanskrit. Fall: Selections from the two Sanskrit epics, the Mahabharata and the Ramayana. Spring: More selections from the epics and selections from either Sanskrit story literature or from Sanskrit dramas.

Literature in Sanskrit

[SNLIT 467-468 Reading in Sanskrit Literature: The Vedas @ #]
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 2004-2005. C. Minkowski.

Sinhala (Sinhalese)

SINHA 101-102 Elementary Sinhala
101, fall; 102, spring. 6 credits each term. SINHA 102 provides language proficiency and satisfies Option 1. Prerequisite: for SINHA 102, SINHA 101 or equivalent. W. Liyanage. A semi-intensive course for beginners. A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

SINHA 160 Intensive Sinhala
Summer only. 6 credits. Intended for beginners. Offered alternate years. A six-week intensive introduction to one of Sri Lanka's two official languages, and central to many scholarly and applied projects in Sri Lanka. This course provides an unusual opportunity to obtain basic competence in the language during a single summer. Spoken language skills are emphasized during the program, which also introduces the writing system and colloquial reading materials. This lays the foundation for later study of literary Sinhala. When possible, students who already possess basic skills in colloquial Sinhala are admitted for more advanced studies in colloquial and/or literary Sinhala.

SINHA 201-202 Intermediate Sinhala
Reading @
201, fall; 202, spring. 3 credits each term. SINHA 201 provides language proficiency and satisfies Option 1. Prerequisites: for SINHA 201, SINHA 102, for SINHA 202, SINHA 201 or equivalent. W. Liyanage.

[SINHA 203-204 Intermediate Composition and Conversation @
203, fall; 204, spring. 3 credits each term. SINHA 203 provides language proficiency and satisfies Option 1. Prerequisites: for SINHA 203, SINHA 102 or permission of instructor, for SINHA 204, SINHA 203 or equivalent. Not offered 2004-2005. W. Liyanage.]

SINHA 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. W. Liyanage. Taught on a specialized basis to address particular student needs. Times arranged with instructor.

Tagalog

TAG 121-122 Elementary Tagalog
121, fall; 122, spring. 4 credits each term. Prerequisite: for TAG 122, TAG 121. T. Savella. A thorough grounding is given in basic speaking and listening skills with an introduction to reading.

TAG 123 Continuing Tagalog
Fall. 4 credits. Provides language qualification. Prerequisite: TAG 122 or equivalent. T. Savella. Improves speaking skills, such as fluency and pronunciation, focusing on verbal communication skills; offers a wide range of readings; and sharpens listening skills.

TAG 205-206 Intermediate Tagalog @
205, fall; 206, spring. 3 credits each term. TAG 205 provides language proficiency and satisfies Option 1. Prerequisites: for TAG 205, TAG 123 or equivalent; for TAG 206, TAG 205 or equivalent. T. Savella. This course develops all four skills: reading, writing, speaking, and comprehension.

TAG 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. T. Savella. Taught on a specialized basis to address particular student needs. Times arranged with instructor.

THAI 101-102 Elementary Thai
101, fall; 102, spring. 6 credits each term. THAI 102 provides language qualification. Prerequisite: for THAI 102, THAI 101 or equivalent. Taught on a specialized basis to address particular student needs. Times arranged with instructor.

THAI 201-202 Intermediate Thai
Reading @
201, fall; 202, spring. 3 credits each term. THAI 201 provides language proficiency and satisfies Option 1. Prerequisites: for THAI 201, THAI 102; for THAI 202, THAI 201 or equivalent. N. Jagacinski. A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

THAI 203-204 Intermediate Composition and Conversation @
203, fall; 204, spring. 3 credits each term. THAI 203 provides language proficiency and satisfies Option 1. Prerequisites: for THAI 203, THAI 102, for THAI 204, THAI 203. N. Jagacinski. Intermediate instruction in spoken and written grammar and reading comprehension.

THAI 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. N. Jagacinski. Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

THAI 301-302 Advanced Thai
301, fall; 302, spring. 4 credits each term. THAI 302 provides language proficiency and satisfies Option 1. Prerequisite: THAI 202 or equivalent. N. Jagacinski. Selected readings in Thai writings in various fields.

THAI 303-304 Thai Literature @
303, fall; 304, spring. 4 credits each term. Satisfies Option 1. Prerequisite: THAI 302 or equivalent. N. Jagacinski. Reading of significant novels, short stories, and poetry written since 1850.

THAI 401-402 Directed Individual Study
401, fall; 402, spring. 4 credits each term. For advanced students or students with special problems or interests. Prerequisite: permission of instructor. N. Jagacinski.

Urdu

See also listings under HINDI/ASIAN 125.

URDU 125 Introduction to the Urdu Script (also ASIAN 125)
Spring. 1 credit. Prerequisite: HINDI 101 or permission of instructor. A. Fatih. This course provides instruction in the basics of the Urdu script. It is intended primarily for students who have had some exposure to Hindi or Urdu but who have had little or no formal training in the script. The course focuses on mastering the script and pronunciation. It does not provide instruction in grammar.
Vietnamese

VIET 101-102 Elementary Vietnamese
101, fall, 102, spring, 6 credits each term. VIET 102 provides language qualification. Prerequisite: for VIET 102, VIET 101 or equivalent. Intended for beginners or students placed by examination. T. Tranviet.

A thorough grounding is given in all language skills: listening, speaking, reading, and writing.

VIET 201-202 Intermediate Vietnamese @ 201, fall; 202, spring, 3 credits each term. VIET 201 provides language proficiency and satisfies Option 1. Prerequisite: permission of instructor only. T. Tranviet.

Continuing instruction in spoken and written Vietnamese.

VIET 203-204 Intermediate Vietnamese Composition and Reading @ 203, fall; 204, spring, 3 credits each term. VIET 203 provides language proficiency and satisfies Option 1. Prerequisite: permission of instructor. Designed for students and "native" speakers of Vietnamese whose speaking and listening are at the advanced level, but who still need to improve writing and reading skills.

VIET 300 Directed Studies
Fall or spring, 1-4 credits variable. Prerequisite: permission of instructor. T. Tranviet.

Taught on a specialized basis to address particular student needs. Times arranged with instructor.

VIET 301-302 Advanced Vietnamese @ 301, fall or spring; 302, fall or spring, 3 credits each term. Satisfies Option 1. Prerequisites: for VIET 301, VIET 202 or permission of instructor; for VIET 302, VIET 301. T. Tranviet.

Continuing instruction in spoken and written Vietnamese; emphasis on enlarging vocabulary, increasing reading speed, and reading various genres and styles of prose.

VIET 401-402 Directed Individual Study 401, fall; 402, spring, 2-4 credits variable each term. Prerequisite: permission of instructor. Intended for advanced students. T. Tranviet.

Various topics according to need.

Vietnamese Literature

[VTLT 222-223 Introduction to Classical Vietnamese @ # 222, fall; 223, spring, 3 credits. VTLL 222 provides language proficiency and satisfies Option 1. Prerequisite: qualification in Vietnamese or permission of instructor. Not offered 2004-2005. K. Taylor]

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.

Asia/General Courses

ANTHRO 374 Human Paleoanthropology
AEM 464 Economics of Agricultural Development (also ECON 464)
AEM 657 Topics in Economic Development (also ECON 770)
COMM 242/654 Communication in the Developing Nations
ECON 473 Economics of Export-Led Development
GOVT 674 Theory and Practice of Nationalism
HIST 495 Kings and States: Asian Models
ART H 260 Introduction to Art History: Approaches to Asian Art
ILRIC 637 Labor Relations in Asia
D SOC 205 Rural Sociology and International Development

China—Area Courses

ANTHR 655 East Asia: Readings in Specific Problems
ECON 469 Economy of China
ECON 772 Economics of Development
[GOVT 347 Government and Politics of China]
[GOVT 437 Contemporary China: Society and Politics]
[GOVT 438 Contemporary China: Political Economy]
GOVT 449/749 Politics and Magic: Popular Religion and Political Power in China
GOVT 642 Comparative Political Economy: East and Southeast Asia
GOVT 645 Chinese Politics
HIST 243 China and the West before Imperialism
HIST 293 History of China Up to Modern Times
HIST 294 China in Modern Times
HIST 492 Undergraduate Seminar in Medieval Chinese History
HIST 493/693 Problems in Modern Chinese History
HIST 791—792 Seminar in Medieval Chinese History
ART H 380 Introduction to the Arts of China
ART H 481 The Arts in Modern China

Japan—Area Courses

ANTHR 345 Japanese Society
ANTHR 655 East Asia: Readings in Specific Problems
ARCH 333 Elements, Principles, and Theories in Japanese Architecture
GOVT 642 Comparative Political Economy: East and Southeast Asia
[HIST 230 Japan and the Pacific War]

South Asia—Area Courses

[ANTHR 275 Human Biology and Evolution (also BIOES 275 and NS 275)]
[ANTHR 321 Sex and Gender]
ANTHR 339 Peoples and Cultures of the Himalayas
[ANTHR 406 Culture of Lives]
[ANTHR 621 Sex and Gender]
ANTHR 640—641 South Asia: Readings in Specific Problems
[ANTHR 673 Human Evolution: History, Concepts, and Theory (also BIOES 873)]
ARCH 342 Architecture as a Cultural System
ARCH 441—442 Special Topics in Architectural Culture and Society
ARCH 445 Architecture and the Mythic Imagination
ARCH 446 Topics in Architecture, Culture, and Society
ARCH 447 Architectural Design and the Utopian Tradition
ARCH 647—648 Architecture in its Cultural Context I & II
ARCH 649 Graduate Investigations in Architecture, Culture, and Society
CRP 671 Seminar in International Planning
[ECON 475 Economic Problems of India]
HD 436 Language Development (also PSYCH 436 and LING 436)
HD 633 Seminar on Language Development

Southeast Asia—Area Courses

[ANTHR 322 Magic, Myth, Science, and Religion (also RELST 322)]
[ANTHR 336 People and Cultures of Mainland Southeast Asia]
ANTHR 420 Development of Anthropology Thought
[ANTHR 424 Anthropology Amongst Disciplines]
[ANTHR 619 Anthropology Approaches to Study of Buddhism(s) in Asia]
ANTHR 628 Political Anthropology: Indonesia
ANTHR 634—635 Southeast Asia: Readings in Specific Problems
GOVT 642 Comparative Political Economy: East and Southeast Asia
HIST 234 History of Siam and Thailand
HIST 395 Southeast Asian History from the Eighteenth Century
HIST 695 Early Southeast Asia: Graduate Proseminar

HIST 297/497 Japan Before 1600
HIST 328 State, Society, and Culture in Modern Japan
HIST 420 Tale of Genji in Historical Perspective
HIST 489 Seminar in Modern Japanese History
HIST 796 Seminar in Japanese Thought
ILHR 656 International Human Resource Management
[MUSIC 481 Japanese Music: Style and Tradition]
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 Asian Americans 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 concentration 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 Concentration

The program's undergraduate concentration affords students an opportunity to develop a multidisciplinary approach to the study of Asians in the hemispheric Americas. The course of study stresses developments 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 adviser from among the program's affiliated faculty and must complete at least 15 units of credits as follows: a) AAS 110 and two additional courses in Asian American Studies; b) one course in African American, American Indian, U.S. Latino Studies, or Feminist, Gender, and Sexuality Studies; and c) one course in East Asian, South Asian, or Southeast Asian Studies.* (These courses must be approved by the student's faculty adviser, and they should address issues of race, gender, or the histories and cultures of Asian peoples.) Students must file an application for the concentration with the Asian American Studies Program.

Resource Center

The program's Asian American Studies Resource Center provides meeting space for the more than 40 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, a current news clipping file, a comprehensive data base of publications on Asian Americans since 1977, and a sizable collection of videotapes as well as music CDs on the Asian American experience.

Research

The program encourages faculty and student research on Asian Americans by sponsoring guest lectures, conferences, film festivals, readings, and exhibits. It also funds research projects and student travel to conferences and research sites. The Asian American Studies Workshop is the program's principal research initiative, engaging Cornell's faculty and students with invited faculty from other universities in a yearlong intensive study of selected themes.

Core Faculty

D. Chang, V. Munasinghe, T. Tu, S. Wong

Advisory Board

T. Chaloemtiarana (Southeast Asia Program), B. de Hary (Asian America), D. Chang (history), S. Han (sociology), V. P. Kayastha (Koch Library), J. V. Koschmann (history), V. Munasinghe (anthropology), V. Nee (sociology), N. Sakai (Asian studies), S. Samuels (English), A. M. Smith (government), K. W. Taylor (Asian studies), T. Tu (history of art), Wai-Kwong Wong (Gannett Health Center), S. Wong, director (English), D. Yeh (vice president student/academic services)

Courses

AAS 110 Introduction to Asian American Studies (III or IV) (CA)
Spring. 3 credits. This course can be used to satisfy either a social science or humanities distribution requirement. T. Tu.

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 language, gender, class, ethnic—in the formation of "Asian American" identities; and 4) to link historical experiences with contemporary issues.

AAS 111 Introduction to Asian American Studies: New Approaches to Understanding Asian American Diversity, the Twentieth Century (also AM ST 110, HIST 161, and LSP 110) (III) (HA)
Fall. 4 credits. D. Chang and M. C. Garcia
For course description, see AM ST 110.

AAS 210 Sophomore Seminar: South Asian Diasporic Locations (also ANTHR 210) (II) (CA)
Spring. 4 credits. V. Munasinghe.

This interdisciplinary course, with an emphasis on anthropology, introduces students to the multiple routes/roots, lived experiences, and imagined worlds of South Asians who have traveled to various lands—Fiji, South Africa, Mauritius, Britain, Malaysia, the United States, and Trinidad—as well as within South Asia itself, at different historical moments. The course begins with the labor migrations of the 1950s and continues to the present. We compare and contrast the varied expressions of the South Asian Diaspora to critically evaluate transnational identity.

This is a special seminar sponsored by the John S. Knight Institutes Sophomore Seminars Program Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the disciplines outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15.

Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

AAS 211 Sophomore Seminar: Race and the American City: Reading San Francisco and New York (also ENGL 211) (IV) (LA)

AAS 212 American Diversity in the Twentieth Century (also HIST 213, AM ST 211)
For course description, see HIST 213.

AAS 213 Asian American History (also HIST 263)
Fall. 4 credits. D. Chang.
For description, see HIST 263.

AAS 262 Asian American Literature (also ENGL 262)
For description, see ENGL 262.

AAS 303 Asians in the Americas: A Comparative Perspective (also ANTHR 303) (III) (CA)
Fall. 4 credits. V. Munasinghe.

The common perception of ethnicity is that this is a "natural" and an inevitable consequence of cultural difference. "Asians" versus, in particular, the United States 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 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.

AAS 412 Undergraduate Seminar in Asian American History (also HIST 412)
Spring. 4 credits. Not offered 2004-2005. For description, see HIST 412. A reading and research seminar that covers various topics in Asian American history.

AAS 413 Race, Technology and Visuality (also ART H 413) (IV) (LA)
Fall. 4 credits. T. Tu Examines how new information and communication technologies have altered the ways we visualize and perform racial identities. In this course we question 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 techno-literacy, creativity, ownership, and agency; how race is embodied (through visual and linguistic cues) in the ostensibly disembodied domains of virtual media; and how the emergence of interactive, online, electronic entertainment, and mobile technologies have allowed artists to generate new images of and ideas about racial and ethnic identities.
AAS 414  Populaol Culture in Asian America (also ART H 414) (IV) (LA)
Spring. 4 credits. Permission of instructor required. T. Tu.

Through a series of "case studies," this course examines the forms and practices of Asian American popular culture (including music, film, video, print and visual, decorative, and performance arts), within the historical, social, political, and economic contexts that have shaped their production. What is the relationship of these popular forms to the histories of Asian American community arts? How have Asian American's engagements with "the popular" altered "traditional" modes of individual and collective representation, artistic production, cultural exchange, and political critique? We also consider how the circulation of Asian popular culture in the United States (from anime to Bollywood and beyond) has altered our understanding of "Asian American culture" and "Asiaanness" more generally.

AAS 424  Asian American Communities (also HIST 420, AM ST 420)

AAS 438  Immigration and Ethnic Identity (also SOC 438)
Spring. 4 credits. Not offered 2004-2005. For description, see SOC 438.

AAS 453  Twentieth-Century American Women Writers of Color (IV) (LA)

AAS 478  Self and Nation in Asian-American Literature (also ENGL 478)

AAS 479  Ethnicity and Identity Politics: An Anthropological Perspective (also ANTH 479)

AAS 495  Independent Study
Fall or spring. 1-4 credits. Staff. Title and topic credits to be mutually arranged between faculty and student. Independent Study Forms must be approved by Asian American Studies Program Office.

AAS 497  Jim Crow and Exclusion-Era America (also HIST 297/697) (HI)
Spring. 4 credits. Limited to 15 students. D. Chang.

This seminar examines America during the overlapping era of segregation and immigration exclusion. Beginning with contests over the meaning of freedom during reconstruction and running through the institution of Jim Crow legislation and immigration exclusion, the course ends with an evaluation of mid-twentieth century movements for civil rights and equality. Themes include the links between racial and economic oppression, legal and de facto restriction, everyday resistance, and struggles for equality.

ASTRONOMY

Cornell's astronomy faculty, research staff, graduate, and undergraduate students are active in diverse areas of modern astronomy ranging from theoretical astrophysics and general relativity to radio and radar astronomy, infrared and optical astronomy, and the exploration of the solar system. Cornell operates two local optical observatories, the world's largest radio telescope at Arecibo, Puerto Rico, and with two other institutions, the 200-inch optical telescope at Mt. Palomar in California. With Caltech, Cornell is carrying out a design study for a large submillimeter telescope in the high Atacama desert in Chile. Several members of the department faculty are also principal investigators on major NASA space and planetary exploration missions.

The department offers a number of courses to satisfy a general interest in astronomy. These courses have few or no prerequisites and are not intended for the training of professional astronomers. Among the introductory courses, several choices are available, depending on background and on the requirements to be fulfilled. The 100-level courses are designed primarily for non-science majors. The alternative introductory sequence ASTRO 211-212 is geared toward sophomore physical science and engineering majors and requires coregistration in beginning calculus. ASTRO 201 and 202 are intended for students with an interest in astronomy but no scientific background, they are topical rather than survey-oriented. ASTRO 332 is designed for physical science and engineering majors as an introduction to astrophysics. Other courses at the 200 and 300 levels appeal to students of various backgrounds and interests, as indicated in the individual course descriptions. Courses numbered above 400 are intended for students who have had two to three years of college physics and at least two years of college mathematics. ASTRO 440, Independent Study, permits students to engage in individual research projects under the guidance of a faculty member. Interested students are encouraged to become members of the undergraduate Cornell Astronomy Club. The club has access to the Fuertes Observatory 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 choices 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 112-213-214 or 116-217-218 and the complementary mathematics MATH 111-122-221-222 or 191-192-293-294 (or equivalent). Students who anticipate undertaking graduate study are urged to elect the honors physics sequence PHYS 116-217-218-219-220 or equivalent. The major requirements stress the importance of a strong preparation in physical science. The following upper-level courses are normally required: PHYS 314 or 318, 316, 323 or 327, 341 and 443 A & E PHYS 321-322 (or equivalent, e.g., MATH 420 and 422)

ASTRO 410, 431, and 432.

Upon consent of the major adviser, students interested in planetary studies may substitute appropriate advanced courses or may pursue an independent major under the program in the Science of Earth Systems. Majors are encouraged to supplement the above courses with any astronomy, physics, or other appropriate courses at or above the 300 level. Advanced seniors can enroll in astronomy graduate courses with the consent of the instructor. Students are also encouraged to work with faculty members on independent study projects under the course ASTRO 440 or to apply to a variety of programs at Cornell, Arecibo, and elsewhere that offer undergraduates summer employment as research assistants. Nearly all undergraduate majors and concentrators become involved in research projects in the junior and senior years.

Students whose interest in astronomy is sparked somewhat late in their undergraduate career are encouraged to discuss possible paths with the director of undergraduate studies in Astronomy.

Honors. A student may be granted honors in astronomy upon the recommendation of the Astronomy Advisers Committee of the astronomy faculty.

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.

Concentration. The concentration in astronomy for other majors normally requires 12 credits, at least eight of which must be at the 300 level or above. ASTRO 233 and 242 are recommended for sophomores planning to concentrate in astronomy.
Distribution Requirement
All courses in astronomy, except ASTRO 233 and 234, may be used to fulfill the science distribution requirement in the College of Arts and Sciences.

Courses

ASTRO 101 The Nature of the Universe (I) (PBS)
Fall. 4 credits. No prerequisites. Labs limited to 18 students each and discussions limited to 30 students each. T. Herter, labs: G. Stacey and staff.
This course 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 102 Our Solar System (I) (PBS)
Spring. 4 credits. Labs limited to 18 students each; discussions limited to 30 students each. S. Squyres; labs: G. Stacey and staff.
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 thinking 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 impact hazards, the search for life on other worlds, the physics of cometary and asteroidal comets, and the orbit of Pluto and other transneptunian objects. General astronomical concepts relevant to the study of the solar system are also discussed. Critical thinking 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 impact hazards, the search for life on other worlds, the physics of cometary and asteroidal comets, and the orbit of Pluto and other transneptunian objects.

ASTRO 103 The Nature of the Universe (II) (PBS)
Fall. 3 credits. T. Herter.
Identical to ASTRO 101 except for omission of the laboratory (see description above).

ASTRO 104 Our Solar System (II) (PBS)
Spring. 3 credits. S. Squyres.
Identical to ASTRO 102 except for omission of the laboratory.

ASTRO 105 An Introduction to the Universe (I) (PBS)
Summer. 3 credits. Prerequisite: high school physics recommended. E. Howell.
M. Nolan.
How do we measure the size of our galaxy and the size of the universe? Is the universe round or flat? How are the stars born, why do they shine, and how do they die? What are the chemical elements, and how were they formed in stars? What are quasars, pulsars, and black holes? How was the solar system formed? What are the environments of other planets like? What is the basic structure of Earth and the other planets? Will we catastrophically alter the earth? Does life exist elsewhere in the universe? How can we find out? Each student has an opportunity to make observations with small telescopes.

ASTRO 106 Essential Ideas in Relativity and Cosmology (I) (PBS)
Summer. 3 credits. Prerequisites: high school algebra and trigonometry.
R. A. Saenz.
An 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 107 An Introduction to the Universe (II) (Cosmology) (PBS)
Summer. 4 credits. E. Howell, M. Nolan.
Identical to ASTRO 105 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 195 Observational Astronomy (I) (PBS)
Fall. 3 credits. Limited to 24 students.
Permission of instructor required.
G. Stacey.
This course 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 will be used. Planned exercises include five or six observational labs (with binoculars and small telescopes, telescope observations and CCD imaging of star clusters, nebulae, and the planets, solar observations, radio observations of the Milky Way Galaxy, plus a selection of books to use for the following: experiments in navigating 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, computer simulations of the orbits of planets and their satellites, and cosmological explorations using data from the Hubble Space Telescope available on the web.

ASTRO 201 Our Home in the Universe (I) (PBS)
Fall. 3 credits. Assumes no scientific background. Course intended for freshmen and sophomores. Permission of instructor required.
J. Lloyd.
A 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. We present a nonmathematical introduction to these subjects and discuss uncertainties and unresolved issues in our understanding.

ASTRO 202 Our Home in the Solar System (I) (PBS)
Spring. 3 credits. Prerequisite: some background in science is required. Course intended for freshmen and sophomores.
J. Veverka.
This writing course is 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 extraterrestrial planets and extraterrestrial intelligence, and the exploration of Mars.

ASTRO 211 Astronomy: Stars, Galaxies, and Cosmology (I) (PBS)
Fall. 4 credits. Intended for engineering and physical sciences freshmen and sophomores. Prerequisite: introductory calculus or coregistration in MATH 111 or 191, or consent of instructor.
J. Hauck.
The topics to be discussed include the following: the formation and evolution of normal and extreme stars, the structure and evolution of galaxies, and cosmology.

ASTRO 212 The Solar System: Planets, Satellites, and Rings (I) (PBS)
Spring. 4 credits. Intended for first- and second-year engineering and physical sciences students. Prerequisite: introductory calculus or coregistration in MATH 111 or 191, some knowledge of classical physics (mechanics and thermodynamics).
D. Campbell, P. Nicholson.
An introduction to the solar system, with emphasis on the application of simple physical principles. Topics include: the Sun, nucleosynthesis of the elements, radioactive decay, the solar wind, neutral and ionized rotational lines 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 books to use for the following: experiments in navigating 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, computer simulations of the orbits of planets and their satellites, and cosmological explorations using data from the Hubble Space Telescope available on the web.

ASTRO 223 Sophomore Seminar: Topics in Astronomy and Astrophysics: The Origin of Cosmic Structures
Fall. 2 credits. Prerequisites: PHYS 112 or 116 and 213 or 217, MATH 112, 122 or 192.
Permission of instructor. Enrollment limited to 15 students. Intended for sophomores planning to major in astronomy or related fields. D. Campbell.
Topics may change yearly. The fall 2004 course will be offered as a Knight sophomore seminar and will explore the theme "From Planets to Galaxies: The Origin of Cosmic Structures." Emphasis is placed on the context and methodology of such issues as interstellar chemistry and nucleosynthesis, observational tools, such as optical spectroscopes and sun dials, laboratory spectroscopy, experiments in planetary cratering, collection and study of micrometeorites, computer simulations of the orbits of planets and their satellites, and cosmological explorations using data from the Hubble Space Telescope available on the web.

These courses are designed to provide a solid foundation in the field of astronomy and to prepare students for more advanced study in astronomy and related fields.
seminars aim at initiating students into the disciplines outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

ASTRO 234 Modern Astrophysical Techniques
Spring. 2 credits. Prerequisites: 2 semesters of introductory physics and 2 semesters of calculus. ASTRO 235 or permission of instructor. Some experience with computer programming expected. Intended for sophomores or juniors majoring or concentrating in astronomy or related fields. Staff. This course reviews the basic techniques employed in astrophysical research, both observational and theoretical, to explore the universe. Basic methods and strategies of data acquisition and image and signal processing are discussed. Students gain hands-on experience with visualization techniques and methods of error analysis, data fitting, and numerical simulation. Exercises address the processes by which astrophysical pieces together observations made with today’s foremost astronomical instruments and data, sometimes raising questions concerning the origin of planets, stars, galaxies, and the universe itself.

ASTRO 280 Space Exploration (I) (PBS)
Fall. 3 credits. Not offered 2004–2005. S. Squyres. This course provides an overview of space science, with particular emphasis on the solar system, and a detailed examination of a few selected objects, including the planet Mars, the satellites in the outer solar system, and comets. The focus is on methods of collecting information and especially on spacecraft and space missions. Topics include the design and limitations of instruments. Ethical and political questions associated with space exploration are discussed. Intended for students with an interest in science, technology, and associated policy issues, and a background in physical sciences, math, or engineering is assumed.

ASTRO 290 Relativity and Astrophysics (I) (PBS)
Spring. 4 credits. Prerequisites: knowledge of freshman physics, calculus, and geometry. J. Wasserman. This course 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 gravity; the physics of white dwarfs, neutron stars, and black holes; and an introduction to modern cosmology.

ASTRO 299 Search for Life in the Universe (I) (PBS)
Spring. 4 credits. Prerequisites: 2 courses in any physical science subject or permission of instructors. J. Cordes, Y. Terzian. The contents of the universe are surveyed. Theories of cosmic and stellar evolution, and of the formation and evolution of planetary systems, planetary atmospheres, and surfaces are reviewed. Questions regarding the evolution of life and the development of technology are discussed. Methods to detect extraterrestrial life with emphasis on radio telescopes and computational instrumentation are presented. Hypothetical communication systems are developed and discussed.

[ASTRO 310 Planetary Imaging Processing (I) (PBS)]
Fall. 3 credits. Prerequisites: two semesters of introductory physics and experience with computer programming expected. Intended for sophomores or juniors majoring or concentrating in astronomy or related fields. Not offered 2004–2005. J. Bell.

This course reviews the basic techniques employed in the collection and processing of spacecraft images of planets, moons, rings, asteroids, and comets, from both the observational and theoretical perspectives. Students gain hands-on experience with digital image manipulation, including visualization, calibration, statistics, and error analysis. Specific examples involve the processing and analysis of imaging data from missions like Voyager, Clementine, Galileo, NEAR, Mars Pathfinder, Mars Global Surveyor, and the Hubble Space Telescope. Exercises encompass the range of techniques used by planetary scientists to acquire and process spacecraft data that are then used to address questions about the geology, composition, and evolution of solar system bodies.

ASTRO 331 Climate Dynamics (also EAS 331) (I) (PBS)
Fall. 4 credits. Prerequisite: MATH 112 or 192 or equivalent or instructor’s approval. J. Cook, P. Giersch.

Processes that determine climate and contribute to its change are discussed, including atmospheric radiation, ocean circulation, and atmospheric dynamics. Contemporary climate change issues are introduced and investigated and discussed in the context of natural variability of the system.

ASTRO 332 Elements of Astrophysics (I) (PBS)
Spring. 4 credits. Prerequisites: MATH 112, 122, 192, or equivalent. PHYS 213 or 217. P. Goldsmith, P. Nicholson.

This course is divided into 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, Friedmann equations, dark matter, cosmological tests, the early universe, and the cosmological production of the elements.

[ASTRO 434 The Evolution of Planets (I) (PBS)]

ASTRO 440 Independent Study in Astronomy
Fall or spring. 2–4 credits. Prerequisite: permission of instructor. Recommended: familiarity with the topics covered in ASTRO 352, 431, or 434. Individual study or independent research. A program of study is devised by the student and instructor. Students need to fill out an independent study form, have it signed by the instructor, and register in the department office, 610 Space Sciences Building.

ASTRO 445 Introduction to General Relativity (also PHYS 445) (I) (PBS)
Fall. 4 credits. E. Flanagan.

For description, see PHYS 445.

ASTRO 490 Senior Seminar Critical Thinking (I) (PBS)
Fall. 3 credits. No prerequisites. Course is open to all students. Y. Terzian.

Critical thinking and its role in scientific contexts with selections from the history of astronomy. Topics include elements of classical logic, including standards of
The nature of time, the nature of reality, the 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 intelligences. Fallacies, illusions, and paradoxes will also be discussed on controversial topics. The course includes debates by the students.

**ASTRO 509 General Relativity** (also PHYS 553)
Fall. 4 credits. Prerequisite: knowledge of special relativity and methods of dynamics at the level of Classical Mechanics by Goldstein. J. York.

A systematic introduction to Einstein's theory using both modern and classical methods of computation. Topics include review of special relativity, differential geometry, foundations of general relativity (GR), laws of physics in the presence of gravitational fields, GR as a dynamical theory, experimental tests of GR. At the level of Gravitation by Misner, Thorne, and Wheeler.

**ASTRO 510 Applications to General Relativity** (also PHYS 554)
Spring. 4 credits. Prerequisite: ASTRO 509. J. York.

A continuation of ASTRO 509 that emphasizes applications to astrophysics and cosmology. Topics include astrophysical neutron stars, gravitational collapse and black holes, gravitational waves and cosmology, use of dynamics to formulate astrophysical and cosmological computations.

**ASTRO 511 Physics of Black Holes, White Dwarfs, and Neutron Stars** (also PHYS 525)
Spring. 4 credits. The minimum prerequisites for this course are all of the physics at the upper division undergraduate level. 1. Wasserman.

Compact objects (neutron stars, black holes, and white dwarfs) are the endpoints of stellar evolution, responsible for some of the most exotic phenomena in the universe, including supernova explosion, radio pulsars, bright X-ray binaries, magnetars, and gamma-ray bursts. Supermassive black holes also lie at the heart of the violent processes in active galaxies and quasars. The study of compact objects allows one to probe physics under extreme conditions (high densities, strong magnetic fields, and gravity). This course surveys the astrophysics of compact stars and related subjects. Emphasis is on the application of diverse theoretical physics tools to various observations of compact stars. There are general relativity or general relativity prerequisites. At the level of Physics of Black Holes, White Dwarfs, and Neutron Stars by Shapiro and Teukolsky.

**ASTRO 516 Galactic Structure and Stellar Dynamics**

This course is an 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, the shape 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 520 Radio Astronomy**

Covers radio astronomy telescopes and electronics, antenna theory; observing procedures and data analysis; concepts of interferometry and aperture synthesis.

**ASTRO 523 Signal Modeling, Statistical Inference, and Data Mining in Astronomy**
Fall. 4 credits. J. Cordes.

The course 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 covered include probability theory; Fourier analysis of continuous and discrete signals; digital filtering; matched filtering and pattern recognition; spectral analysis; Kalman-Loeve analysis; wavelet 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 genetic programming. The course is self-contained and is intended for students with thorough backgrounds in the physical sciences or engineering.

**ASTRO 525 Techniques of Optical/Infrared and Submillimeter Astronomy**
Spring. 4 credits. G. Stacey, staff.

Optical infrared and submillimeter telescopes and instrumentation are discussed and related to current research in these fields. The course includes telescope design and general optical design (ray tracing). CCD, photodetectors, bolometer, impurity 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 555 Theory of the Interstellar Medium**

Covers global theories of the interstellar medium—mass and energy exchange between the different phases; the role of shock waves and energetic outflows in the thermal equilibrium and ionization state of gas in the galaxy; basic astrophysical fluids and plasmas; galactic dynamics; and observation techniques, current problems and results.

**ASTRO 560 Theory of Stellar Structure and Evolution** (also PHYS 667)
Fall. 4 credits. D. Chernoff.

This course is 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 570 Physics of the Planets**

An introductory survey of planetary science with an emphasis on the application of physical principles. Planetary dynamics, including satellite orbits, tidal interactions, resonances, and ring dynamics. An introduction to the theory of planetary interiors, gravitational fields, heat sources, and rotational mechanics. Physics of planetary atmospheres, including radiative transfer, convection, and thermal structure. Important observational results, including those of ground-based optical, infrared, radio, and radar astronomy, as well as those made by spacecraft, are discussed. Intended for graduate students and seniors in astronomy, physics, and engineering.

**ASTRO 571 Mechanics of the Solar System** (also T&M 672)
Spring. 3 credits. J. Burns.

For description, see T&M 673.

**ASTRO 579 Celestial Mechanics** (also T&M 672)

For description, see T&M 672.

**ASTRO 590 Galaxies and the Universe**
Fall. 4 credits. T. Hutter.

ASTRO 599 Cosmology (also PHYS 599)  
This course is intended to provide a detailed theoretical development of current ideas in cosmology. Topics include observational overview; growth of irregularities, galaxy formation, and clustering; big bang cosmology; reheating, nucleosynthesis, very early universe; symmetry breaking, inflationary scenarios. At the level of Principles of Physical Cosmology by Peebles.

ASTRO 620 Seminar: Advanced Radio Astronomy  
The emphasis of the course in spring 2004 will be on large-scale surveys in radio astronomy, an interest stimulated by the forthcoming L-band (18–23 cm wavelength) array receiver (ALFA) at the Arecibo Observatory in late 2004. This instrument will revolutionize our ability to search for pulsars, hidden and low-mass galaxies, and transient sources and to probe the structure of the Milky Way. The seminar will focus on a) major surveys carried out in radio and at other wavelengths in recent years; their scientific goals, and technical challenges, and b) plans and prospects for major surveys that are likely to take place in this decade with the L-band feed array at Arecibo. Large surveys require new paradigms for observational astronomy, particularly in connection with data acquisition, excision of artificial and natural interference, the management of extremely large databases, the development of robust tools for data mining, and the timely delivery of data products to archives that are accessible to the wider community.

ASTRO 621 Seminar: Planetary Radio Astronomy  
The application of radio to the study of the surfaces of planets, planetary satellites, asteroids, and comets. Topics covered are target detectability and the specification of the needed antennas, transmitters, and receiving systems; data processing techniques; imaging techniques including delay-Doppler imaging, synthetic aperture radar (SAR) and interferometric SAR; target characterization from cross section, scattering laws, and polarization measurements; results from earth-based and spacecraft radar observations of Mercury, Earth, the Moon, Mars, the satellites of Jupiter, the rings of Saturn, asteroids, and comets.

ASTRO 640 Advanced Study and Research  
For spring. Credit TBA. Guided reading and seminars on topics not currently covered in regular courses.

ASTRO 651 Atmospheric Physics (also EAS 651)  
Fall. 3 credits. S. Colucci, P. Gierasch. For description, see EAS 651.

ASTRO 652 Advanced Atmospheric Dynamics (also SCAS 652)  
Spring. 3 credits. S. Colucci, P. Gierasch. For description, see EAS 652.

ASTRO 660 Cosmic Electrodynamics (also PHYS 660)  
Selected topics discussed in detail: the solar wind, stellar winds, Bondi accretion, Bondi-Hoyle accretion, accretion disks with B fields, magneto-rotational instability, magneto-centrifugal winds and jets from disks, Poynting jets, funnel flows, the propeller stage of accretion, advection and convection dominated accretion flows, fast dynamo processes in astrophysics.

ASTRO 671 Seminar: Saturn  
Fall. 3 credits. P. Nicholson.
On July 2004 the Cassini/Huygens spacecraft will enter orbit around Saturn, after a seven-year interplanetary cruise. This course reviews current knowledge of Saturn's atmosphere and interior structure; the geology and surface of its largest satellite Titan (the target of the Huygens probe); the composition and dynamics of the rings; and the smaller icy moons. Much of this information is derived from the Voyager flybys in 1980 and 1981, supplemented by subsequent-telescopic observations from the ground and from the Hubble Space Telescope. We emphasize outstanding issues and puzzles, and examine how these are attacked by Cassini observations during its four-year orbital tour.

ASTRO 673 Seminar: Planetary Atmospheres  
This course deals with motions in planetary atmospheres. Among the topics discussed are the Venus general circulation, dust and water transports on Mars, alternating jets in the outer planets, and compositional layering in the outer planets.

ASTRO 690 Seminar: Computational Astrophysics (also PHYS 480/680)  
Spring. 3 credits. Prerequisites: working knowledge of FORTRAN. Staff. For description, see PHYS 480/680.

ASTRO 699 Seminar: Problems in Theoretical Astrophysics (also PHYS 665)  
An informal seminar that explores current research problems in astrophysics, with focus on high-energy and relativistic phenomena. Possible topics include compact stars, supermassive black holes, high-energy cosmic rays, and neutrino and gravitational wave astronomy. Both the theoretical and observational/experimental aspects will be discussed by the lecturer and among the participants. This seminar is open to all graduate students.

ASTRO 699 Seminar: Observational High-Energy Physics  
Spring. 2 credits. ASTRO 511 (PHYS 525) is strongly recommended as a co- or prerequisite. Not offered 2004–2005. Staff.

ASTRO 699 Seminar: Cosmology  
Fall. 2 credits. Prerequisites: intended for graduate students and upper-level undergraduates by permission of instructor.

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 at Cornell is available to students enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. Student services provided by the Office of Undergraduate Biology, 216 Stimson Hall, are available to students from either college.

The biology major is designed to enable students to acquire the foundation 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 animal physiology; biochemistry, comparative evolution and evolutionary biology; general biology; genetics and development; insect biology; microbiology; molecular and cell biology; neurobiology and behavior; nutrition; plant biology; and systematic and biometric diversity. Students interested in the marine sciences may consult the Shoals Marine Laboratory Office (G14 Stimson Hall, 255–3717) for academic and career advising. For more details about the biology curriculum, see the "Biological Sciences" section in this catalog or visit the Office of Undergraduate Biology web site, www.bio.cornell.edu.

BIOLOGY AND SOCIETY MAJOR

B. Chabot, director of undergraduate studies, College of Arts and Sciences; N. Breen, advising coordinator, College of Human Ecology; D. Gurak, advising coordinator, College of Agriculture and Life Sciences;

The Biology and Society major is designed to enable students who wish to combine training in biology with perspectives from the social sciences and humanities on the social, political, and ethical aspects of modern
biology. In addition to providing a foundation in biology, Biology & Society students gain a background in the social dimensions of modern biology and in the biological dimensions of contemporary social issues.

The Biology & Society major, which involves faculty from throughout the university, is offered by the Department of Science & Technology Studies. Students in the College of Arts and Sciences, the College of Human Ecology, and the College of Agriculture and Life Sciences are eligible for the major. The major is for students in all colleges through the Biology & Society Office.

Students can get information, specific course requirements, and application procedures for the major from the Biology & Society office in 306 Rockefeller Hall, 255-6047.

Because the major is multidisciplinary, students must attain a basic understanding of the several disciplines it comprises. The curriculum includes courses in ethics; statistics; history, philosophy, and social studies of science and biology; and basic biology (e.g., genetics and development, chemistry and molecular-cell biology, ecology, evolutionary biology), as well as integrative courses offered through Biology & Society. Majors are required to take a core course and must develop a theme, an intellectually coherent grouping of courses representative of their special interest in biology and society. Recommended themes in the Biology & Society major include biology, behavior, and society; biology and human population; biology and public policy; environment and society; and health and society. Students may also develop their own individually tailored themes (which in recent years have included topics such as biotechnology and society; agriculture, environment; and society). In consultation with their faculty adviser, students select courses that meet the foundation and core course requirements so as to build a coherent theme.

Sample curricula for the recommended themes and for several student-developed themes are available in the Biology & Society office. A list of all course descriptions is available in 306 Rockefeller Hall.

Student advisers and faculty members are available (according to posted office hours or by appointment) in the Biology & Society offices, 306 Rockefeller Hall or 131 Rockefeller Hall, to answer questions and to provide assistance.

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 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 all major foundation prerequisites are met before satisfactory completion of the introductory biology sequence. Although only introductory biological science is a prerequisite for acceptance, students will find it useful to have completed some of the other requirements (listed below) by the end of their sophomore year, preferably by the end of the first semester. Students who are considering the major may also find it beneficial to take S&TS 201, "What is Science?" in their freshman or sophomore year. Human Ecology students should also consult the current Human Ecology guide and meet with the college advising coordinator, Nancy Breen, 205 Martha Van Rensselaer Hall, 255-1928.

Major Requirements
No single course may satisfy more than one major requirement. All courses must be taken for a letter grade.

1) Basic courses
   A. BIO G 101-104 or 105-106 or 107-108 (prerequisite for admission to Biology and Society).
   B. College calculus (one course):* MATH 106, 111, 112 or any higher-level calculus.
   C. Recommended but not required: General chemistry (one year sequence) (prerequisite to biochemistry and other chemistry courses): CHEM 103-104, 206, 207-208, or 215-216.

2) Foundation Courses (should be completed by end of junior year).
   Foundation courses are intended to provide a basic introduction to methodology and theory in their area. These courses must be above the 100 level, at least three credit hours, and taken for a letter grade.
   A. Ethics: one course; B&SOC 205 (also S&TS 205) or B&SOC 206 (also S&TS 206, PHIL 240).*
   B. Social sciences/humanities foundation: two courses; one from any two of the following subject areas: history of science; philosophy of science; sociology of science; politics of science; and science communication.*
   C. Biology foundation (breadth requirement): three courses; one each from the following subject areas: general and cellular biology (BIOB 350 or 351 or 353 or NS 320); Ecology (BIOEE 261); Evolutionary Biology (BIOEE 278); genetics and development (BIOGID 261 or 262 or PL BR 225); neurobiology and behavior (BION 222); animal behavior (BION 221); and anatomy and physiology (BIOAP 311 or NS 341 but NOT BIOAP 212),

   * Students may petition to take a second course (an advanced course, in sequence with the statistics course taken in the foundation) in place of the calculus requirement.

3) Core Course: (one course). Should be completed by end of junior year.
   B&SOC 301: Life Sciences and Society (also S&TS 301); or S&TS 260: Science and Human Nature (also PHIL 260).

4) Theme (five courses that correspond to the theme selected by the student). These courses must be above the 100-level, at least three credit hours, and taken for a letter grade. Choose these courses as follows:
   A. Natural science issues/biology elective (two courses). Select from the list of B&SOC 301 and natural science issues courses or choose course(s) with introductory biology as a prerequisite from: ALS, AN SC, BIOSCI, ENTOM, FOOD, HD, NS, NTRES, PL BR, PL PA, PSYCH, VTMED.
   B. Humanities/social sciences electives** (two courses). Courses from the list of senior seminars may be used as theme electives if not used to meet another requirement, or select humanities or social sciences courses in consultation with the faculty advisor.
   C. Senior seminar** (One course taken senior year). Courses change yearly.

   ** Among the courses taken to meet the social sciences and humanities requirements (2A, 2B, 3, 4.B, and 4.O), a minimum of two social science courses and two humanities courses must be chosen. History of science, philosophy of science, and ethics courses may be counted toward the humanities requirement for the major.

   *** A list of approved depth courses using NS 115 as a prerequisite is available in 306 Rockefeller Hall.

Independent Study
Projects under the direction of a Biology & Society faculty member are encouraged as part of the program of study in the student's theme area. Applications for research projects are accepted by individual faculty members. Students may enroll for 1-4 credits in B&SOC 575 (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. Independent study credits may not be used in completion of the major requirements.

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

Biology & Society majors are considered for entry into the honors program at the end of the second semester of the junior year. Application forms for the honors program are available in the Biology & Society office, 306 Rockefeller Hall. The honors program is available to Biology & Society majors from the College of Arts and Sciences. Biology & Society majors in the Colleges of Human Ecology and Agriculture and Life Sciences 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 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 advisers. 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 two semesters and may take three to five credits per semester up to a maximum of eight credits in B&B. Honors Project I and II. 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 (255-6094).

People to contact for Biology & Society Honors Information:
In Arts and Sciences: Brian Chabot, director of undergraduate studies, bfc1@cornell.edu
In Agriculture and Life Sciences: David Pimentel, faculty representative to CALS Honors Committee, dp188@cornell.edu
In Human Ecology: Nancy Breen, advising coordinator, CHE, nb5@cornell.edu

Further Information
Professor Brian Chabot, director of undergraduate studies, bfc1@cornell.edu
Professor Douglas Gurak, advising coordinator, College of Agriculture and Life Sciences, dg2@cornell.edu
Dr. Nancy Ileen, advising coordinator, College of Human Ecology, nb5@cornell.edu
Susan Sullivan, Biology & Society Advising Office, 306 Rockefeller Hall; (607) 255-6047, sfc1@cornell.edu
web site: www.sts.cornell.edu

I. First-Year Writing Seminars and Introductory Course
Consult the John S. Knight Institute brochure for times, instructors, and descriptions.

SATS 101 Science and Technology in the Public Arena
Fall. 3 credits. This course is recommended as an introduction to the field. It is not required and may not be used to fulfill a major requirement. J. Reppy.
For description, see STS listings, SATS 101.

II. Foundation Courses

A. Ethics (one course)

B&B SOC 205 Ethical Issues in Health and Medicine (also SATS 205) (IV) (KCM)
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. We explore 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.

B&B SOC 206 Ethics and the Environment (also SATS 206, PHIL 240) (IV) (KCM)
Spring. 4 credits. Limited to 50 students.
Open to all undergraduates; permission of instructor required for freshmen. N. Sethi.
The aim of this course is 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. Our 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.

R. Social Sciences/Humanities Foundation (two courses, one from any two areas)

1. History of Science

[SATS 233 Agriculture, History, and Society: From Squanto to Biotechnology]
For description, see STS listings, SATS 233.

[SATS 282 Science in Western Civilization (also HIST 282)]
Spring. 4 credits. P. Dear.
For description, see HIST 282.

[SATS 283 The Sciences in the Twentieth Century (also HIST 280)]
Fall. 4 credits. Staff.
For description, see HIST 283.

[SATS 287 Evolution (also BIOEE 207, HIST 287)]
Fall or summer. 3 credits. May not be taken for credit after BIOEE 278. A. MacNeill.
For description, see BIOEE 207.

[SATS 355 Computers: From Babbage to Gates]
Fall. 4 credits. R. Prentice.
For description, see STS listings, SATS 355.

[SATS 390 Science in the American Polity: 1800–1960 (also GOVT 308, AM ST 388)]
For description, see SATS 390.

[SATS 433 Comparative History of Science]
For description, see STS listings, SATS 433.

[SATS 444 Historical Issues of Gender and Science (also FGSS 444)]
Spring. 4 credits. S. Seth.
For description, see STS listings, SATS 444.

[SATS 447 Seminar in the History of Biology: Why Is Evolutionary Biology So Controversial? (also BIOEE 467, B&B SOC 447, HIST 415)]
Fall or summer (6-week session). 4 credits. Limited to 18 students. S-U grade optional.
For description and prerequisites, see BIOEE 467.

2. Philosophy of Science

[SATS 201 What Is Science? An Introduction to the Social Studies of Science and Technology (also SOC 210)]
Spring. 3 credits. T. Pinch.
For description, see STS listings, SATS 201.

[SATS 286 Science and Human Nature (also PHIL 286)]
Spring. 4 credits. May be used to meet the philosophy of science requirement if not used to meet the core course requirement. R. Boyd.
For description, see PHIL 286.

[SATS 381 Philosophy of Science: Knowledge and Objectivity (also PHIL 381)]
Fall. 4 credits. R. Boyd.
For description, see PHIL 381.

3. Sociology of Science

[B&B SOC 301 Life Sciences and Society (also SATS 301)]
Fall. 4 credits. May be used to meet the sociology of science requirement if not used to meet the core course requirement. M. Lynch.
See Core Courses for description.

[B&B SOC 442 Sociology of Science (also SATS 442, SOC 442, CPB 442)]
For description, see STS listings, SATS 442.

[HD 452 Culture and Human Development]
For description, see HD 452.
ARTS AND SCIENCES - 2004-2005

NS 245 Social Science Perspectives on Food and Nutrition
Fall. 3 credits. J. Schal.
For description, see NS 245.

[D SOC 208 Technology and Society
For description, see D SOC 208.]

D SOC 220 Sociology of Health and Ethnic Minorities (also LSP 220)
Fall. 3 credits. P. Parra.
For description, see D SOC 220.

S&TS 201 What Is Science? An Introduction to the Social Studies of Science and Technology (also SOC 210)
Spring. 3 credits. T. Pinch.
For description, see S&TS listings, S&TS 201.

S&TS 311 The Sociology of Medicine
Spring. 4 credits. C. Leuenberger.
For description, see S&TS 311.

[S&TS 411 Knowledge, Technology, and Property
For description, see S&TS 411]}

4. Politics of Science

[B&SOC 406 Biotechnology and Law (also S&TS 406)
For description, see S&TS 406.]

B&SOC 407 Law, Science, and Public Values (also S&TS 407)
Spring. 4 credits. M. Lynch.
For description, see S&TS listings, S&TS 407.

CRP 380 Environmental Politics
Fall. 4 credits. R. Booth.
For description, see CRP 380.

PAM 230 Introduction to Policy Analysis
Fall or spring. 4 credits. J. Gerner, R. Avery.
For description, see PAM 230.

S&TS 324 Environment & Society (also D SOC 324, SOC 324)
Fall. 3 credits. C. Geisler.
For description, see D SOC 324.

S&TS 391 Science in the American Polity: 1960–Now (also GOVT 309, AM ST 389)
Spring. 4 credits. S. Hilgartner.
For description, see S&TS 391.

[S&TS 427 Politics of Environmental Protection (also GOVT 420)

5. Science Communication

COMM 260 Scientific Writing for Public Information
Fall and spring. 3 credits. Limited to 25 non-freshman or graduate students per section. S. Conroe.
For description and prerequisites, see COMM 260.

COMM 421 Communication and the Environment
Spring. 3 credits. May be used in Foundation only if not taken as senior seminar. J. Shanahan.
For description, see COMM 421.

S&TS 285 Communication in the Life Sciences (also COMM 265)
Spring. 3 credits. B. Lewenstein.
For description, see COMM 285.

S&TS 352 Science Writing for the Mass Media (also COMM 352)
Fall. 3 credits. B. Lewenstein.
For description and prerequisites, see COMM 352.

[S&TS 466 Public Communication of Science and Technology (also COMM 466)
Fall. 3 credits. Limited to 15 students. May be used in Foundation only if not taken as senior seminar. Not offered 2004–2005. B. Lewenstein.
For description and prerequisites, see COMM 466.]

C. Biology Foundation (breadth requirement): Three courses: one from three of the following subject areas:

1. Biochemistry, Molecular and Cell Biology

BIOBM 330 Principles of Biochemistry, Individual Instruction
Fall and spring. 4 credits. J. Blankenship, P. Hinkle, staff.
For description and prerequisites, see BIOBM 330.

BIOBM 331 Principles of Biochemistry: Proteins and Metabolism
Fall. 3 credits. May not be taken for credit after BIOBM 330 or 333. G. Feigenson.
For description and prerequisites, see BIOBM 331.

BIOBM 333 Principles of Biochemistry, Lectures
Summer. 4 credits. H. Nivison.
For description and prerequisites, see BIOBM 333.

[NS 320 Introduction to Human Biochemistry
For description and prerequisites, see NS 320.]

2. Ecology

BIOEE 261 Ecology and the Environment Invertebrates
Fall and summer. 4 credits. Not open to freshmen. B. Chabot, A. Dhondt, N. Hairston.
For description and prerequisites, see BIOEE 261.

3. Genetics and Development

BIODG 281 Genetics
Fall, spring, and summer. 5 credits. Not open to freshmen fall semester. Limited to 200 students. M. Goldberg, T. Fox, R. MacIntyre.
For description and prerequisites, see BIODG 281.

BIODG 282 Human Genetics
Spring. 2 or 3 credits (2 cr. if taken after BIODG 281). Must be taken for 3 credits to fulfill Biology & Society requirements. Limited to 25 per discussion group. M. Goldberg.
For description and prerequisites, see BIODG 282.

4. Evolutionary Biology

BIOEE 278 Evolutionary Biology
Fall and spring. 3 or 4 credits. M. Geber, M. Shulman, staff.
For description, see BIOEE 278.

5. Animal Behavior

BIONB 221 Neurobiology and Behavior I: Introduction to Neurobiology
Spring. 3, 4, or 5 credits. P. Sherman, staff.
For description and prerequisites, see BIONB 221.

6. Neurobiology and Behavior

BIONB 222 Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits. C. Linster, staff.
For description and prerequisite, see BIONB 222.

7. Physiology and Anatomy

BIOP 311 Introductory Animal Physiology, Lectures (also VTBMS 346)
Fall. 3 credits. E. Loew, staff.
For description and prerequisites, see BIOP 311.

NS 341 Human Anatomy and Physiology
Spring. 4 credits. Permission only. Must preregister for lab in 309 MVR during CourseEnroll. V. Utermohlen.
For description and prerequisites, see NS 341.

8. Biological Diversity

BIOMI 290 General Microbiology
Lectures
Fall, spring, and summer. 2 or 3 credits.
Must be taken for 3 credits to fulfill major requirement. B. Batzgo, W. Ghirose.
For description and prerequisites, see BIOMI 290.

BIOPL 241 Introductory Botany
Fall. 3 credits. K. Niklas.
For description, see BIOPL 241.

BIODE 274 The Vertebrates: Structure, Function, and Evolution
Spring. 4 credits. K. Zamudio.
For description and prerequisites, see BIOEE 274.

BIODE 373 Biology of the Marine Invertebrates
Fall. 5 credits. J. Morin.
For description and prerequisites, see BIOEE 373.

BIODE 470 Herpetology, Lectures
Spring. 2 credits. Must be taken in conjunction with 472 to count for major credit. H. Greene.
For description and prerequisites, see BIOEE 470.

[BIODE 471 Mammalogy
For description and prerequisites, see BIOEE 471.]

BIODE 472 Herpetology, Laboratory
Spring. 2 credits. Must be taken in conjunction with 470 to count for major credit. H. Greene.
For description and prerequisites, see BIOEE 472.

BIODE 475 Ornithology
Spring. 4 credits. D. Winkler.
For description and prerequisites, see BIOEE 475.
SOC 301 Evaluating Statistical Evidence (also D SOC 302)  
Fall. 4 credits. M. Clarkberg.  
For description, see SOC 301.

III. Core Courses  

B&SOC 301 Life Sciences and Society (also SATS 301) (III) (SBA)  
Fall. 4 credits. Prerequisite: 2 semesters of social science or humanities and 1 year of introductory biology or permission of instructor. Limited to 50 students. M. Lynch.  
Critical thinking about the diverse influences shaping the life sciences. Topics include evolution and natural selection, heredity and genetic determinism, biotechnology, and reproductive interventions. We 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.

SATS 286 Science and Human Nature (also PHIL 286)  
Fall. 4 credits. R. Boyd.  
For description, see PHIL 286.

IV. Themes  

A. Natural Science Issues: Biology Elective (two courses). Select from the following list of B&SOC-approved natural science issues courses or those courses with intro biology as a prerequisite from: AN SCI, BIOSCI, ENTOM, FOOD, HD, NS, NTRES, PL BR, PL PA, PSYCH, VET MED.

B&SOC 214 Biological Basis of Sex Differences (also BIOAP 214 and FGSS 214)  
Spring. 3 credits. J. Fortune.  
For description, see BIOAP 214.

B&SOC 347 Human Growth and Development: Biological and Behavioral Interactions (also HD 347, NS 347)  
Spring. 3 credits. Offered alternate years. J. Haas and S. Robertson.  
For description and prerequisites, see HD 347.

[BIOPL 247 Ethnobiology]  
For description, see BIOPL 247.

HD 220 Biological Issues in Human Development: The Human Brain and Mind  
Fall. 3 credits. E. Temple.  
For description, see HD 220.

HD 266 Emotional Functions of the Brain  
Fall. 3 credits. R. DePue.  
For description, see HD 266.

HD 344 Infant Behavior and Development  
Fall. 3 credits. Not open to freshmen. S. Robertson.  
For description and prerequisites, see HD 344.

HD 366 Psychobiology of Temperament and Personality  
Fall. 3 credits. R. DePue.  
For description and prerequisites, see HD 366.

HD 433 Developmental Cognitive Neuroscience  
Spring. May be used as depth course if BIOEN 221 or 222 is taken as breadth. 3 credits. E. Temple.  
For description, see HD 433.

[HD 436 Language Development (also LING 436, PSYCH 436, COGST 436)]  
For description, see HD 436.

NS 222 Maternal and Child Nutrition  
Fall. 3 credits. Limited to 25. C. Garza, P. Brannon.  
For description and prerequisites, see NS 222.

NS 331 Physiological and Biochemical Bases of Human Nutrition  
Spring. 4 credits. C. McCormick.  
For description and prerequisites, see NS 331.

NS 361 Biology of Normal and Abnormal Behavior (also PSYCH 361)  
Fall. 3 credits. Limited to juniors and seniors only. B. Strupp.  
For description and prerequisites, see NS 361.

NS 452 Molecular Epidemiology and Dietary Markers of Chronic Disease  
Spring. 3 credits. P. Cassano.  
For description and prerequisites, see NS 452.

NS 475 Mechanisms of Birth Defects  
Spring. 3 credits. P. Stover.  
For description and prerequisites, see NS 475.

NTRES 201 Environmental Conservation  
Spring. 3 credits. T. Fahey.  
For description, see NTRES 201.

PSYCH 326 Evolution of Human Behavior  
Spring. 4 credits. B. Johnston.  
For description and prerequisites, see PSYCH 326.

Examples of biology electives  

AN SCI 300 Animal Reproduction and Development  
Spring. 3 credits.  
For description, see AN SCI 300.

HD 366 Psychobiology of Temperament and Personality  
Fall. 3 credits. R. DePue.  
For description and prerequisites, see HD 366.

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 210 Introductory Statistics  
Spring. 4 credits. C. VanEs.  
For description and prerequisites, see AEM 210.

BTRY 261 Statistical Methods I  
Summer. 4 credits. Staff.  
For description and prerequisites, see BTRY 261.

BTRY 301 Statistical Methods I  
Fall. 4 credits. P. Sullivan.  
For description and prerequisites, see BTRY 301.

BTRY 414 Introduction to Statistical Reasoning for Urban and Regional Analysis  
Fall. 3 credits. Not offered 2004–2005. Staff.  
For description, see BTRY 223.

ECON 319 Introduction to Statistics and Probability  
Fall and spring. 4 credits. Y. Hong, F. Molinari.  
For description and prerequisites, see ECON 319.

ILRST 210 Statistics: Statistical Reasoning  
Fall and spring. 3 credits. P. Velleman.  
For description, see ILRST 210.

MATH 171 Statistical Theory and Application in the Real World  
Fall and spring. 4 credits. Staff.  
For description, see MATH 171.

PAM 210 Introduction to Statistics  
Fall and spring. 4 credits. K. Joyner, E. O’Neill, R. Swisher.  
For description, see PAM 210.

PSYCH 350 Statistics and Research Design  
Fall. 4 credits. T. Gilovich.  
For description, see PSYCH 350.
NS 331  Physiological and Biochemical Bases of Human Nutrition  
Spring. 4 credits.  
For description, see NS 331.  

R. 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 464  Economics of Agricultural Development (also ECON 464)  
Fall. 3 credits. R. Christy.  
For description, see AEM 464.  

[ANTHRO 211  Nature and Culture  
For description, see ANTHR 211.]  

B&SOC 331  Environmental Governance  
(also S&TS 331 and NTRES 331)  
Spring. 3 credits. S. Wolf.  
For description, see NTRES 331.  

HD 457  Health and Social Behavior (also SOC 457)  
Fall. 3 credits. E. Wethington.  
For description, see HD 457.  

NS 450  Public Health Nutrition  
Spring. 3 credits. K. Rasmussen, D. Pelleiter.  
For description, see NS 450.  

PAM 303  Ecology and Epidemiology of Health  
Fall. 3 credits. F. Rodriguez.  
For description, see PAM 303.  

PAM 380  Human Sexuality  
Spring. 4 credits. A. Parrot.  
For description, see PAM 380.  

PAM 435  U.S. Health Care System  
Fall. 3 credits. R. Battistella.  
For description, see PAM 435.  

PAM 437  Economics of Health Policy  
Spring. 3 credits. K. Simon.  
For description, see PAM 437.  

D SOC 205  Rural Sociology and International Development (also SOC 205)  
Spring. 3 credits. P. McMichael.  
For description, see D SOC 205.  

[D SOC 490  Society and Survival  
Fall. 3 credits. Not offered 2004–2005.  
For description, see D SOC 490.]  

[SOC 340  Health, Behavior, and Policy  
S. Caldwell.  
For description, see SOC 340.]  

Examples of humanities electives  

PHIL 241  Ethics  
Spring. 4 credits. N. Sturgeon.  
For description, see PHIL 241.  

[PHIL 368  Global Climate and Global Justice (also GOVT 468)  
For description, see PHIL 368.]  

[S&TS 481  Philosophy of Science (also PHIL 481)  
R. Boyd.  
For description, see PHIL 481.]  

C. Senior Seminars  

[B&SOC 414  Population Policy (also SOC 418)  
Spring. 3 credits. Staff. Prerequisite: population course or permission of instructor. Not offered 2004–2005.]  

[B&SOC 425  From “Cold Mothers” to “Autistic Dads”—Autism in Twentieth-Century America (also S&TS 425)  
Fall. 4 credits. Offered 2004 and 2005 only. C. Silverman.  
For description, see S&TS 425.  

[B&SOC 427  Politics of Environmental Protection (also S&TS 427 and GOVT 420)  
For description, see S&TS 427.]  

S&TS 431  From Surgery to Simulation  
Fall. 4 credits. R. Prentice.  
For description, see S&TS 431.  

S&TS 446  Biomedical Ethics  
Spring. 4 credits. N. Sethi.  
For description, see S&TS listings, S&TS 446.  

B&SOC 447  Seminar in the History of Biology (also BIOEE 467, HIST 415, and S&TS 447)  
Summer (6-week session). 4 credits. W. Provine.  
For description, see BIOEE 467.  

B&SOC 461  Environmental Policy (also BIOEE 661, ALS 661)  
Fall and spring. Yearlong course, must be started in the fall. 3 credits each term. Limited to 12 students. D. Pimentel.  
For description and prerequisites, see BIOEE 661.  

COMM 421  Communication and the Environment  
Spring. 3 credits. J. Shanahan.  
For description, see COMM 421.  

HD 336  Connecting Social, Cognitive and Emotional Development  
Fall. 3 credits. M. Cassada.  
For description, see HD 336.  

HD 366  Psychobiology of Temperament and Personality  
Fall. 3 credits. R. Depue.  
For description and prerequisites, see HD 366.  

HD 418  Psychology of Aging  
Fall. 3 credits. S. Cornelius.  
For description, see HD 418.  

[HD 419  Midlife Development  
For description, see HD 419.]  

HD 464  Adolescent Sexuality (also FGSS 467)  
Spring. 3 credits. R. Savin-Williams.  
For description, see HD 464.  

HD 660  Social Development  
Spring. 3 credits. Permission of instructor required for undergraduates. K. Greene.  
For description, see HD 660.  

PAM 552  Health Care Services: Consumer and Ethical Perspectives  
Fall. 3 credits. If using this course as a senior seminar, B&SOC majors must take it for four credits. A. Parrot.  
For description, see PAM 552.  

[PAM 556  Managed Care  
Fall. 3 credits. For undergraduate seniors only by permission of instructor. Not offered 2004–2005. J. Kuder.  
For description, see PAM 556.]  

PAM 559  Epidemiology, Clinical Medicine, and Management Interface Issues  
Spring. 3 credits. E. Rodriguez.  
For description, see PAM 559.  

[D SOC 410  Population and Environment  
For description, see D SOC 410.]  

D SOC 438  Population and Development (also SOC 437)  
Fall. 3 credits. D. Gunak.  
For description, see D SOC 438.  

[D SOC 495  Population, Development, and Environment in Sub-Saharan Africa  
For description, see D SOC 495.]  

[S&TS 438  Minds, Machines, and Intelligence (also COGST 438)  

[S&TS 466  Public Communication of Science and Technology (also COMM 466)  
For description and prerequisites, see COMM 466.]  

B&SOC 471  The Dark Side of Biology: Biological Weapons, Bioterrorism, and Biocriminality (also S&TS 471)  
Fall. 4 credits. Prerequisites: at least one course in S&TS and one semester of biology beyond introductory biology. 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.  

[S&TS 490  Integrity of Scientific Practice  
Fall. 4 credits. Not offered 2004–2005. S. Hilgartner.]  

[S&TS 645  Genetics: Politics and Society in Comparative Perspective (also GOVT 634)  
For description, see S&TS listings, S&TS 645.]
V. Other Courses

B&SOC 375 Independent Study
Fall or spring. 1–4 credits. Must have written permission of faculty supervisor and Biology & Society major. Permission of the director of undergraduate studies and Biology & Society faculty member are encouraged as part of the program of study within the student's concentration area. Applications for research projects are accepted by individual faculty members and students may enroll for 1–4 credits in B&SOC 375 (Independent Study) with written permission of the faculty supervisor and may elect either the letter grade or the S/U option. Students may elect to do an independent study project as an alternative to, or in addition to, an honors project. Applications and information on faculty research, scholarly activities, and undergraduate opportunities are available in the Biology & Society Office, 306 Rockefeller Hall. Independent study credits may not be used in completion of the major requirements.

B&SOC 400 Undergraduate Seminar
Fall or spring. Variable credit. May be repeated for credit. From time to time different seminars on topics of interest to undergraduates are offered. Topics and instructors are listed in the Biology & Society supplement (announced at the beginning of each semester.)

B&SOC 498/499 Honors Project I and II
Fall and spring. 3–5 credits each term. Full-year project. Open only to Biology & Society students in their senior year by permission of the department. Students must have an overall GPA of 3.3. Please apply in 306 Rockefeller Hall. Students who are admitted to the honors program are required to complete two semesters of honors project research and to write an honors thesis. The project must include substantial research and the completed work should be of wider scope and greater originality than is normal for an upper-level course. Students may take three to five credits per semester up to a maximum of eight credits in B&SOC 498 and 499. Honors Projects I and II. Students should note that these courses are to be taken in addition to those courses that meet the regular major requirements. B&SOC 498 includes the fall Honors Seminar. The student and the project supervisor must reach clear agreement at the outset as to work to be completed during the first semester. Minimal, an honors thesis outline, bibliography, and draft introductory chapter should be accomplished. At the end of B&SOC 498, Honors Project I, a letter grade will be assigned and the advisers, in consultation with the director of undergraduate studies, will evaluate whether or not the student should continue working on an honors project. Biology & Society students who do continue in the honors program for the second semester will receive a letter grade at the end of their term whether or not they complete a thesis and whether of not they are recommended for honors. Applications and information are available in the Biology & Society Office, 306 Rockefeller Hall.

CHEMISTRY AND CHEMICAL BIOLOGY


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 discipline; it ensures that students will be provided with the most advanced information and perspectives, and affords opportunities for students to participate in research.

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 course 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 410 (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 215–216 or 207–208 (CHEM 211, 208 or 206, 208 are accepted but not recommended); 2) CHEM 300; 3) PHYS 207 or 112 or 116; and 4) MATH 111 or 191. Second-term 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.

BURMESE

See Department of Asian Studies.

Catalan

See Department of Romance Studies.

Cambodian

See Department of Asian 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 Center for Applied Mathematics, 657 Frank H. Rhodes Hall.

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

A listing of selected graduate courses in applied mathematics can be found in the description of the center in the section "Interdisciplinary Centers, Programs, and Studies."
The Standard Major
In addition to the courses required for admission to the major, the following additional courses must be completed for the standard major:

1) CHEM 301–303, 359–360 (357–358 may be substituted), 389–390, and 410,
2) MATH 112, 213, or 122, 221–222, or 192–293,
3) PHYS 208 or 213.

Most standard majors also perform independent research at some point in their academic career, either during the term or in the summer. Many students take advanced courses to complement this program.

The Alternative Major
In addition to the courses required for admission to the major, the following additional courses must be completed for the alternative major:

1) CHEM 251, 257, 287, 289, and 410 (CHEM 357–359 or 355–360 may be substituted for CHEM 257. CHEM 389–390 can be substituted for CHEM 287. Any of these options will also fulfill the advanced-chemistry course requirement.)
2) MATH 112 or 122 or 192
3) PHYS 208 or 213
4) One additional 3- or 4-credit advanced-chemistry course at the 300-level or above
5) 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 a departmental committee.

The three additional courses may be in another field of study, such as biochemistry, physiology, 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 in another department.

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 eight 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 498) 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. Additional information is available from Susan Slack, 424 Kennedy Hall, 255–9255 or Prof. Deborah Trumbull, 426 Kennedy Hall, 257–3108.

Laboratory Course Regulations
Students registered for laboratory courses who do not appear at the first meeting of the laboratory will forfeit their registration in that course.

Students and members of the teaching staff are required to wear safety goggles and lab aprons in all laboratory courses. 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 are necessary, the department will provide new information as soon as possible.

Preliminary examinations for all courses may be given in the evening.

[CHEM 105 The Language of Chemistry (I) (PBS)]
Fall. 3 credits. This course contributes to satisfying the CALS physical science requirement of one course in chemistry. S-U or letter grades. Lecs, M W F. Prelims: in normal class period. Not offered 2004-2005. Staff.

In his autobiography, A. Kornberg (Nobel Laureate in Medicine, 1959) wrote, "much of life can be understood in rational terms if expressed in the language of chemistry. It is an international language, a language for a time; a language that explains where we came from, what we are, and where the physical world will allow us to go." Through careful examination of a few milestone investigations of naturally occurring biologically important compounds (such as the antimalarial quinine, bombykol, and the sperm attractants of algae), the principles of chemistry to which Kornberg refers are developed. Methods of analyzing chemical problems are emphasized, rather than the memorization of specific results or formulas. There is an opportunity for students, working in small groups, to prepare and present short reports on topics of particular current interest at the interface between chemistry and biology.

[CHEM 106 The World of Chemistry (I) (PBS)]
Spring. 3 credits. This course contributes to satisfying the CALS physical science requirement of one course in chemistry. S-U or letter grades. Lecs, M W F. Prelims: March 8, April 7. B. Ganem.

Chemistry is the art, craft, business, and science of substances and their transformations. Since we've learned to look inside, we know that within these substances undergoing change are persistent groupings of atoms called molecules. So chemistry is also played out on the microscopic level. This is a course that looks at the way chemistry enters all aspects of the everyday world and the way it interacts with culture and the economy. We try to gain a feeling for the way science is done and grasp the interplay of chemistry and biology.

[CHEM 206 Introduction to General Chemistry (I) (PBS)]
Fall or summer. 4 credits. Enrollment limited. Lab fee $20 (covers the cost of safety goggles, lab apron, and breakage). Lecs, M W F. Lab, M T W R F. Prelims: Oct. 7, Nov. 11. R. Hoffmann.

An introduction to chemistry, both quantitative and qualitative, this course is intended for those needing a less intensive introduction to chemistry than 207–208.

[CHEM 207–208 General Chemistry (I) (PBS)]
Fall or summer. 207. spring or summer, 208. 4 credits each term. Prerequisite for CHEM 208: CHEM 206 or 207. CHEM 207 lab fee $20 (covers the cost of safety goggles, lab apron, and breakage). Lecs, M T W F. Prelims: Oct. 7, Nov. 11. R. Hoffmann. Spring. M. A. Hines.

Fundamental chemical principles are covered, with considerable attention given to the quantitative aspects and to the techniques important for further work in chemistry.

Note: Entering students exceptionally well prepared in chemistry may receive advanced placement credit for General Chemistry 207 by demonstrating competence in the advanced placement examination of the College Entrance Examination Board or in the departmental examination given at Cornell before classes start in the fall. Taking CHEM 208 after 215 is not recommended and can be done only with the permission of the 208 instructor.

[CHEM 211 Chemistry for the Applied Sciences (I) (PBS)]
Fall or spring. 4 credits. Recommended for those students who intend to take only one term of chemistry. Enrollment limited. Prerequisite: high school chemistry or permission of instructor. Corequisite: a calculus course at the level of MATH 111 or 191. Lab fee $20 (covers the cost of safety goggles, lab apron, and breakage). Lecs, M W F. Labs, M T W R F. Prelims: Sept. 28, Oct. 21, Nov. 23, Mar. 1, Mar. 17, Apr. 19. Fall: J. A. Marohn. Spring: S. Russo.
Important chemical principles and facts are covered with the objective of understanding the role of chemistry in other fields. Emphasis is on topics such as solid-state materials, periodic trends, and specific classes of compounds, such as polymers.

**Note:** Entering students exceptionally well prepared in chemistry may receive advanced placement credit for General Chemistry by demonstrating competence in the advanced placement examination of the College Entrance Examination Board or in the departmental examination given at Cornell before classes start in the fall.

**CHEM 215-216 Honors General and Inorganic Chemistry (I) (PBS)**

Fall: 215; spring: 216. 4 credits each term. (Recommended for students who intend to specialize in chemistry or in related fields.) Enrollment limited. Prerequisites: good performance in high school chemistry, physics, and mathematics. Corequisite: a calculus course at the level of MATH 111 or 191 for students who have not taken high school calculus. Prerequisite for CHEM 216: CHEM 215. CHEM 215 lab fee $20 (covers the cost of safety goggles, lab apron, and breakage). Lecs: M W F; lab, M T W R or F. Prelims: Oct. 7, Nov. 11, Mar. 1, Apr. 12. Fall: B. Widom; spring: B. R. Crane.

An intensive systematic study of the laws and concepts of chemistry, with considerable emphasis on quantitative aspects. Second term includes systems of inorganic chemistry. Laboratory work covers qualitative and quantitative analysis, transition metal chemistry, and spectroscopic techniques.

**Note:** Taking CHEM 208 after 215 is not recommended and can be done only with the permission of 208 instructor.

**CHEM 233 Introduction to Biomolecular Structure**

Fall. 2 credits. Limited to 30 students. Prerequisites: CHEM 207-208 or equivalents. Lecs: T. R. Not offered 2004-2005. This course is intended for students with a basic understanding of chemistry who are considering a program of study in biochemistry. The interrelationship of the structure and function of biologically important molecules is explored. Emphasis is placed on understanding the way in which the three-dimensional arrangements of atoms determine the biological properties of both small molecules and macromolecules such as proteins and enzymes. The study of molecular structure is aided by interactive computer graphics for visualizing three-dimensional structures of molecules.

**CHEM 251 Introduction to Experimental Organic Chemistry**

Fall, spring, or summer. 2 credits. Recommended for non-chemistry majors. Enrollment limited. Prerequisites: coregistration in CHEM 257 or 357. Lecs: fall, R or P; spring, R; lab, M T W R or F. Prelims: fall: Nov. 16; spring: Apr. 28. Fall: S. Russo; spring: T. Rutledge.

Introduction to the synthesis, separation, and handling of materials, including applications of many types of chromatography, simple and fractional distillation, crystallization, extraction, and others.

**CHEM 252 Elementary Experimental Organic Chemistry**


A continuation of CHEM 251.

**CHEM 257 Introduction to Organic and Biological Chemistry (I) (PBS)**

Spring or summer. 3 credits. Prerequisite: CHEM 206 or 207. Because CHEM 257 is only a 3-credit course, it does not provide a practical route to satisfying medical school requirements. Lecs, M W F. Prelims: Feb. 17, Mar. 15. D. A. Usher.

An introduction to organic chemistry with an emphasis on those structures and reactions of organic compounds having particular relevance to biological chemistry.

**Note:** Because of duplication of materials, students who take both 257 and 357 will receive graduation credit only for CHEM 257.

**CHEM 287-288 Introductory Physical Chemistry I (I) (PBS)**

Fall: 287; spring: 288. 3 credits each term. Prerequisites: CHEM 208 or 216 and MATH 111-112 and PHYS 208, or permission of instructor. Prerequisite for CHEM 288: CHEM 207 or 389. Lecs, M W F; 287: rec, M or W, T; 288: rec, M or W. Loring; spring: M or W. Prelims: 287: Oct. 7, Nov. 23. 288: Mar. 10, Apr. 19. Fall: R. Loring; spring: J. A. Marohn.

A systematic treatment of the fundamental principles of physical chemistry, focusing in the fall on thermodynamics, chemical and enzyme kinetics, and an introduction to quantum mechanics. In the spring the course is oriented to the application of physical chemistry to biological systems, including transport, kinetics, electrochemistry, spectroscopy. CHEM 287 satisfies the minimum requirement for physical chemistry in the alternative chemistry major.

**CHEM 289-290 Introductory Physical Chemistry Laboratory**


A 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 300 Quantitative Chemistry**

Fall. 2 credits. Prerequisite: CHEM 208, or CHEM 216 or advanced placement in chemistry. Lec: T (first lecture will be held on R, Aug. 26, at 10:10); lab, M T W R. Prelim: Oct. 21, Nov. 23. D. B. Zax. 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 301 Honors Experimental Chemistry I (I) (PBS)**

Spring. 4 credits. Prerequisites: CHEM 300, and 357 or 359. Lecs: M W F; 2 labs, M W or T R D. B. Collum.

An introduction to the techniques of synthetic organic chemistry. A representative selection of the most important classes of organic reactions is explored in the first half of the semester, augmented by lectures on the reaction chemistry and the theory of separation and characterization techniques. The second half of the term is devoted to a special project, part of which is designed by the student. An opportunity to use inert atmosphere techniques is included.

**CHEM 302 Honors Experimental Chemistry II (I) (PBS)**

Fall. 4 credits. Enrollment limited; preference given to chemistry majors. Prerequisite: CHEM 301. Lecs, M W F; 2 labs, M W, T, R. F. J. DiSalvo.

Instrumental methods of analysis, including chemical microscopy, visible and infrared spectroscopies, and gas chromatography. Basic concepts of interfacing will be covered.

**CHEM 303 Honors Experimental Chemistry III (I) (PBS)**

Spring. 4 credits. Each lab limited to 10 students. Prerequisites: CHEM 302, 350. Coregistration in the latter is permissible. Lecs, M W F; 2 labs, M W, or T R H. F. Davis.

An introduction to experimental physical chemistry, including topics in calorimetry, spectroscopy, and kinetics. The analysis and numerical simulation of experimental data is stressed.

**CHEM 357-358 Organic Chemistry for the Life Sciences (I) (PBS)**

Fall or summer, 357; spring or summer, 358. 3 credits each term. Prerequisite for CHEM 357. CHEM 208 or 216 or advanced placement, recommended. Concurrent registration in CHEM 251 or 300.


A study of the more important classes of carbon compounds—especially those encountered in the biological sciences. Emphasis is placed on 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.

**Note:** Because of duplication of material, students who take both CHEM 257 and 357 will receive graduation credit only for CHEM 257.

**CHEM 359-360 Honors Organic Chemistry I and II (I) (PBS)**

Fall, spring, 360. 4 credits each term. Recommended for students who intend to specialize in chemistry or closely related fields. Enrollment limited. Prerequisites: CHEM 216 with a grade of B or better, CHEM 208 with a grade of A or better, or permission of instructor. Prerequisite for CHEM 360: CHEM 359. Recommended coregistration in CHEM 300-301-302. Lecs, M W F, dis sec, W; prelims, Sept. 15, Oct. 13, Nov. 10, Feb. 9, Mar. 2, Apr. 13. Fall: D. A. Usher; spring: D. T. McQuade.

A 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.
The principles of physical chemistry are studied from the viewpoint of the laws of thermodynamics, kinetic theory, statistical mechanics, and quantum chemistry.

**CHEM 391 Physical Chemistry II (also CHEM 391) (I) (PBS)**

Spring. 4 credits. Enrollment limited to engineering students only. Prerequisites: MATH 293; PHYS 112, 213; CHEM 389 or equivalent. Corequisites: CHEM 294. Lecs. M W F; rec M or T. T. M. Duncan.

1) Classical thermodynamics—empirical laws that convert measurable quantities pressure, temperature, volume, and composition into abstract quantities enthalpy, entropy and Gibbs energy to describe chemical systems; and 2) chemical kinetics—reaction rate laws from experimental data and reaction mechanism analysis methods and applications to photolithography, polymerization, and catalysis.

**CHEM 404 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 405 Techniques of Modern Synthesis (I) (PBS)**

Spring. 3 or 6 credits. Enrollment limited. Prerequisites: CHEM 302 and permission of instructor. To receive 3 credits, students must perform a minimum of three 2-week experiments. Six credits will be given for 3 additional experiments. Completion of 5 exercises in elementary glass-blowing will count as 1 experiment. Lab time required: 16 hours each week, including at least two 4-hour sessions in 1 section (M W 1-2). Lec, first week only. Not offered 2004–2005. J. M. Burlitch.

**CHEM 410 Inorganic Chemistry (I) (PBS)**

Fall. 4 credits. Prerequisites: CHEM 358 or 360, and 287 or 390. Lecs, M W F. Prelims: Sept. 21, Oct. 21, Nov. 16. R. C. Fay.

A systematic study of the synthesis, structure, bonding, reactions, and uses of inorganic, organometallic, and solid-state compounds.

**CHEM 421 Introduction to Inorganic Chemistry Research**

Fall or spring. 2–4 credits. Prerequisites: CHEM 303 and 390–390, or CHEM 287–288, and CHEM 390–290 with an 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 433 Introduction to Analytical Chemistry Research**

Fall or spring. 2–4 credits. Prerequisites: CHEM 305 and 390 with an average of B– or better or permission of instructor. Selected faculty.

Research in analytical chemistry involving both laboratory and library work, planned in consultation with a faculty member.

**CHEM 450 Principles of Chemical Biology (I) (PBS)**

Spring. 3 credits. Prerequisites: CHEM 357–358, CHEM 359–360 or equivalent. Lecs, M W F. T. P. Begley.

This course 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 covered 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 461 Introduction to Organic Chemistry Research**

Fall or spring. 2–4 credits. Prerequisites: CHEM 302 and 358 or 360 with a grade of B– or better or permission of instructor. Selected faculty.

Research in organic chemistry involving both laboratory and library work, planned in consultation with a faculty member.

**CHEM 477 Introduction to Physical Chemistry Research**

Fall or spring. 2–4 credits. Prerequisite: CHEM 390 with an average of B– or better or permission of instructor. Selected faculty.

Research in physical chemistry involving both laboratory and library work, planned in consultation with a faculty member.

**CHEM 498 Honors Seminar**

Spring. No credit. Admission only by departmental invitation. Additional prerequisites or corequisites: outstanding performance in two coherent 4-credit units of research in a course such as CHEM 421, 433, 461, or 477; or an equivalent amount of research in another context. S. Lee.

Informal presentations and discussions of selected topics in which all students participate. Professional issues are discussed, including graduate education, publication, techniques of oral and audiovisual presentation, employment, ethics, chemistry in society, and support of scientific research. Participants will report on their research in a paper and an oral presentation.

**CHEM 600-601 General Chemistry Colloquium**

Fall, 600; spring, 601. No credit. Staff.

A series of talks by distinguished visitors, as well as presentations of all fields of current research interest in chemistry given by distinguished visitors and faculty members.

**CHEM 602 Information Literacy for the Physical Scientist**

Spring. 1 credit. Primarily for graduate students and undergraduate chemistry majors doing research. Lec. T. L. Solla.

An 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, reactions and analytical instrumentation, web resources, using specialized resources in chemistry, physics, biochemistry, and materials science; and managing citations.

**CHEM 605 Advanced Inorganic Chemistry I: Symmetry, Structure, and Reactivity**

Fall. 4 credits. Prerequisite: CHEM 390 or equivalent or permission of instructor. Lecs, M W F. P. T. 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 concepts, substitution, electron transfer, and related reactions. Readings are at the level of Bishop's group theory and Jordan's reaction mechanisms of inorganic and organometallic systems.

**CHEM 606 Advanced Inorganic Chemistry II: Synthesis, Structure, and Reactivity of Coordination Compounds, and Bioinorganic Chemistry**

Spring. 4 credits. Prerequisite: CHEM 605 or equivalent or permission of instructor. Lecs, M W F. Not offered 2004–2005. P. T. Wolczanski.

Synthesis, structure, and reactivity of modern coordination compounds and organometallic systems. The mechanisms of transition-metal reactions are emphasized, and evaluation of the current literature will be stressed. Background readings are at the level of Jordan's reaction mechanisms of inorganic and organometallic systems and Collman, Hegedus, Finke, and Norton's Principles and Applications of Organotransition Metal Chemistry.

**CHEM 607 Advanced Inorganic Chemistry III: Solid-State Chemistry**

Fall. 4 credits. Prerequisite: CHEM 605 or permission of instructor. Lecs, M W F. Not offered 2004–2005. S. Lee.


**CHEM 608 Advanced Inorganic Chemistry I: Symmetry, Structure, and Reactivity**

Spring. 4 credits. M W F. P. T. Wolczanski.

Synthesis, structure, and reactivity of organometallic compounds. Evaluation of the current literature will be emphasized, and background readings are at the level of Jordan's reaction mechanisms of inorganic and organometallic systems and Collman, Hegedus, Finke, and Norton's Principles and Applications of Organotransition Metal Chemistry.

[CHEM 625 Advanced Analytical Chemistry I] Spring; 4 credits. Prerequisite: CHEM 288 or 390 or equivalent. Lees, M W F; occasional prelms W. D. B. Zax. The application of high-resolution NMR spectroscopy to chemical problems. Depending on the time and class interest, either infrared and mass spectroscopy or some practical experience in NMR will be offered.

[CHEM 627 Advanced Analytical Chemistry II] Spring; 3 credits. Primarily for graduate students. Prerequisite: CHEM 7/3 or equivalent is preferable. Lees, M W F. Not offered 2004–2005. D. B. Zax. Modern techniques in nuclear magnetic resonance. Little overlap is expected with CHEM 625, as this course focuses on more general questions of experimental design, understanding of multipulse experiments, and aspects of coherent averaging theory. Examples taken from both liquid and solid-state NMR. May also be of interest to other coherent spectroscopists.

[CHEM 628 Isotopic and Trace Element Analysis (also NS 690)] Spring; 3 credits. Primarily for graduate students and advanced undergraduates. Prerequisite: CHEM 288 or 390 or 32, or CHEM 288 and PHYS 288, or permission of instructor. Lees T R. Not offered 2004–2005. Offered alternate years. J. T. Brenna. Survey course in modern high-resolution 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 microscopes, X-ray and electron spectroscopies, and biological and solid state applications.

[CHEM 629 Electrochemistry] Fall; 4 credits. Primarily for graduate students and junior and senior undergraduates. Prerequisite: CHEM 390 or equivalent (MATH 213 helpful). Lees, T R. H. D. Abruna. Fundamentals and applications of electrochemistry. Topics include the fundamentals of electrode kinetics, electron transfer theory, the electrical double layer, diffusion, and other modes of transport. A wide range of techniques and their application as well as instrumental aspects are covered.

[CHEM 650-651 Organic and Organometallic Chemistry Seminar] Fall, 650; spring 651. No credit. Required of all graduate students majoring in organic or bioorganic chemistry. Juniors and seniors are encouraged to attend. M. Staff. A 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 665 Advanced Organic Chemistry] Fall; 4 credits. Primarily for graduate students and junior and senior undergraduates. Prerequisites: CHEM 358 or 360, and 390 or equivalents or permission of instructor. Lees, M W F. D. T. McQuade. Designed to couple concepts learned in physical chemistry to those learned in organic chemistry. To this end, the course is divided into three portions: thermodynamics, kinetics, and mechanistic techniques and models. Students are encouraged to participate in voluntary arrow-pushing sessions held five to six evenings during the semester. The course caters to those with a strong background in chemistry but can be successfully navigated by graduate students in other disciplines.

[CHEM 666 Synthetic Organic Chemistry] Spring; 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisite: CHEM 665 or permission of instructor. Lees, T R. J. Najderson. Modern techniques of organic synthesis; applications of organic reaction mechanisms and retrosynthetic analysis to the problems encountered in design and synthesis, with particular emphasis on modern developments in synthesis design.

[CHEM 668 Chemical Aspects of Biological Processes] Fall; 4 credits. Prerequisite: CHEM 360 or equivalent. Lees, T R. T. P. Begley. A representative selection of the most important classes of enzyme-catalyzed reactions is examined from a mechanistic perspective. Topics discussed include the chemical basis of enzymatic catalysis, techniques for the elucidation of enzyme mechanism, cofactor chemistry, and the biosynthesis of selected natural products. The application of chemical principles to understanding biological processes is emphasized.

[CHEM 669 Organic and Polymer Synthesis Using Transition Metal Catalysts] Fall; 4 credits. Prerequisite: primarily for graduate students. CHEM 359/360 or equivalent or by permission of the instructor. Not offered 2004–2005. 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 670 Fundamental Principles of Polymer Chemistry] Fall; 4 credits. Prerequisite: Physical Chemistry 390 and Organic Chemistry 359/360 or equivalent or by permission of instructor. Primarily for graduate students and advanced undergraduates. No previous knowledge of polymers is required. Lees, T R. D. Y. Sogah. 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, and structure-property relationships.

[CHEM 671 Synthetic Polymer Chemistry (also MBBE 671)] Spring; 4 credits. Prerequisites: a minimum of organic chemistry at the level of CHEM 359/360 is essential. Those without this organic chemistry background should see the instructor before registering for the course. Primarily for graduate students and advanced undergraduates. No previous knowledge of polymer chemistry is required although knowledge of materials covered in CHEM 670 will be helpful. Lees, T R. Not offered 2004–2005. D. Y. Sogah. Emphasizes application of organic synthetic methods to the development of new polymerization methods and control of polymer architecture. Emphasis is on 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. Topics on synthesis are selected from the following: step-growth polymerization with emphasis on high-performance materials, recent developments in the synthesis of vinyl polymers with special emphasis on living polymerization methods and ring-opening metathesis polymerizations. The role polymers in nanotechnology will also be covered.

[CHEM 672 Kinetics and Regulation of Enzyme Systems] Spring; 4 credits. Primarily for graduate students with interests in biophysical chemistry. Prerequisite: CHEM 288 or 390, BION 531, or equivalents or permission of instructor. Lees, M W F. Not offered 2004–2005. B. Baird. Focus is on protein interactions with ligands and consequent 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 673 Chemistry of Nucleic Acids] Fall; 4 credits. Primarily for graduate students. Prerequisites: CHEM 358 or 360, and 390 or equivalents. Lees, M W. Not offered 2004–2005. D. A. Usher. Structure, properties, synthesis, and reactions of nucleic acids from a chemical point of view. Special topics include antisense and gene therapy technology, mRNA, ribozyme reactions (including the ribosome), mutagens, PCR. Recent advances in sequencing, DNA as a computer, and alternative genetic materials.

[CHEM 678 Statistical Thermodynamics] Fall; 4 credits. Primarily for graduate students. Prerequisite: CHEM 390 or equivalent; pre- or co-requisite: CHEM 681 or 793 or equivalent. Lees, M W F. G. Chan. Classical thermodynamics at the level of Callen's Thermodynamics and an Introduction to Thermostatistics and statistical thermodynamics at the level of the first twelve chapters of McQuarrie's Statistical Mechanics. Topics in the first part include the first and second laws, free energy, equilibrium, equilibria, chemical potentials, and solutions. Further topics include fluctuations, entropy production, and the second law of thermodynamics; statistical thermodynamics and ensembles; and nonequilibrium processes such as driven systems, irreversible flows, relaxation processes, and phase transitions.
energy and Legandre transforms, convexity, thermodynamic potentials, densities and fields, phase equilibrium, thermodynamics of dilute systems, and the third law. Topics in the second part are partition functions, fluctuations, ideal gases, perfect crystals, and the electronic structure of solids. The course is designed for advanced undergraduates, graduate students with a minor in physical chemistry, and graduate students from related fields with an interest in physical chemistry. At the level of Quantum Chemistry by Levine or Molecular Quantum Mechanics by Atkins.

**CHEM 681 Introduction to Quantum Chemistry**
Fall. 4 credits. Prerequisites: 1 year of undergraduate physical chemistry, 3 semesters of calculus, 1 year of college physics. Lecs 3 times a week. Hoffmann.

An introduction to the application of quantum mechanics in chemistry. This course covers many of the topics in CHEM 793–794 at a more descriptive, less mathematical level. The course is designed for advanced undergraduates, graduate students, and graduate students from related fields with an interest in physical chemistry. At the level of Quantum Chemistry by Levine or Molecular Quantum Mechanics by Atkins.

**CHEM 686 Physical Chemistry of Proteins**
Fall. 4 credits. Primarily for graduate students. Prerequisite: CHEM 288 or 300 or equivalents. Letter grade for undergraduate and graduate students. Lecs, M W F. Brane.

Physical properties of proteins are presented from a quantitative perspective and related to biological function. Topics include: chemical, structural, thermodynamic, hydrodynamic, electrical and conductive properties of soluble and membrane proteins; conformational transitions, protein stability and folding; photochemistry and spectrophotometric properties of proteins; and protein-protein interactions and single molecular studies.

**CHEM 700 Baker Lectures**
Fall. On dates TBA. No credit. Lecs, T R. This year's lecturer: Joanne Stubbe, University of California, Berkeley.

Distinguished scientists who have made significant contributions to chemistry present lectures for approximately six weeks.

**CHEM 701 Introductory Graduate Seminar**

A discussion of professional issues facing young chemists as well as life skills: academic and professional papers, presentations, employment, immigration, publication, research funding, and ethics.

**CHEM 716 Introduction to Solid State Organic Chemistry**
Spring. 3 credits. Prerequisite: CHEM 607 is recommended or some exposure to solid state physics is required. Lecs, 2 times a week. Hoffmann.

Lectures cover the fundamentals of x-ray crystallography and focus on methods for determining the three-dimensional structures of organic molecules. Topics include crystallography, data collection, phasing methods, model building, refinement, structure validation, and structure interpretation.

**CHEM 730 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. Lecs, T R. Not offered 2004–2005. Hoffmann.

This course provides the mathematical background for graduate courses in physical chemistry, such as quantum mechanics, and statistical mechanics. It covers the mathematical methods of solving differential equations: linear algebra, matrices, and the eigenvalue problem; special functions; partial differential equations; integral transforms; functions of a complex variable. The program is designed for both analytical and numerical applications. At the level of Mathematical Methods for Scientists and Engineers by D. A. McQuarrie.

**CHEM 731 Spectroscopy**
Spring. 4 credits. Prerequisite: CHEM 793 or PHYS 443 or equivalent. Lecs, M W F. G. S. Ezra.

Principles of molecular rotational, vibrational, and electronic spectroscopy. Topics include interaction of molecules with radiation; Born-Oppenheimer approximation, diatomic molecules; polyatomic molecules; feasible operations and the molecular symmetry group; and spectroscopy, dynamics, and IVR. At the level of Kroto's Molecular Rotation Spectra.

**CHEM 732 Molecular Collision Theory**

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 733 Quantum Mechanics I**
Fall. 4 credits. Prerequisites: CHEM 390 coregistration in A&amp;E 322, or CHEM 782 or equivalents or permission of instructor. Lecs, M W F. M. A. Hines.

Course topics include Schrodinger's equation, wave packets, uncertainty principle, matrix mechanics, orbital angular momentum, exclusion principle, perturbation theory, and the variational principle.

**CHEM 734 Quantum Mechanics II**
Spring. 4 credits. Prerequisites: CHEM 793 or equivalent or coregistration in A&amp;E 322, or permission of instructor. Lecs, M W F. G. S. Ezra.

Topics include WKB theory, density matrix; time-dependent perturbation theory; molecule-field interaction and spectroscopy; group theory; angular momentum theory; scattering theory; Born-Oppenheimer approximation and molecular vibrations; molecular electronic structure.

**CHEM 735 Statistical Mechanics**
Spring. 4 credits. Prerequisite: CHEM 678 and 793 or equivalent. Lecs, T R. Widom.

This is a continuation of statistical mechanics. Topics include distribution and correlation functions, Ornstein-Zernike theory, potential distribution theorems, McMillan-Mayer solution theory, liquid-state theory, phase equilibria and critical points, lattice models, homogeneity and scaling, renormalization-group theory, inhomogeneous fluids and interfaces, and an introduction to nonequilibrium statistical mechanics.

**CHEM 736 Bonding in Molecules**
Spring. 4 credits. Prerequisite: some exposure to quantum mechanics; a good undergraduate physical chemistry course may be sufficient, or CHEM 681, PHYS 453 or CHEM 793–794 are at a substantially higher level than what is needed. Consult instructor if in doubt. Lecs, T R. Hoffmann.

The aim is to build a qualitative picture of bonding in all molecules, including organic, inorganic, organometallic systems and extended structures (polymer, surfaces, and three-dimensional materials). The approach uses molecular orbital theory to shape a language of orbital interactions. Some basic quantum mechanics is needed, more will be taught along the way. The course is directed at organic, inorganic, and polymer chemists who are not theoreticians; it is useful for...
Classical Civilization

The classical civilization major has four requirements: i) one 200-level course in Greek or Latin; ii) CLASS 211 or HIST 265, CLASS 212 or HIST 268, and CLASS 220; iii) 5 courses selected from those listed under classical civilization, classical archaeology, ancient philosophy, Greek (numbered 104 or above), and Latin (numbered 109 or above); and iv) 3 courses in related subjects selected in consultation with the student’s departmental advisor (see below).

With the permission of the director of undergraduate studies, other survey courses may be substituted for the those listed in (ii).

Related Subjects

Classics is an interdisciplinary field concerned with the study of Mediterranean civilizations from the 15th century BCE to the 6th 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 advisers 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 472. (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.

Independent Study

Independent study at the 300 level may be undertaken by undergraduates upon completion of one semester of work at the 300 level in the relevant field and with the permission of the director of undergraduate studies.

Study Abroad

Cornell is associated with four programs that provide opportunities for summer, semester,
or yearlong study abroad in Greece and Italy. The American School of Classical Studies at Athens offers a summer program for graduate students and qualified undergraduates; College Year in Athens offers semester-long courses (consult Cornell Abroad for details). The Intercollegiate Center for Classical Studies in Rome provides semester-long courses in Latin, Greek, ancient history, art, archaeology, and Italian; the American Academy in Rome offers both full-year and summer programs for qualified graduate students. The Department of Classics awards several travel grants each year for graduate students from the Townsend Memorial Fund; undergraduates are eligible for the Caplan Travel Fellowships (see "Caplan Fellowships" section below). Detailed information on these programs is available in the department office, 120 Goldwin Smith Hall.

Summer Support for Language Study
The Department of Classics has at its disposal resources to assist students who wish to enroll in intensive Latin or Greek in the Cornell summer session. These courses are designed to enable students to enter second-year Latin or Greek the following fall. Preference is given to undergraduate majors in classics and other students needing Latin or Greek for completion of their majors or graduate programs; dyslexic students are accorded additional preference. Two different kinds of support are available: 1) The Knudtzon-Townsend Prize Fellowship provides a $5,000 stipend to cover living expenses and full tuition for either CLASS 103 or CLASS 107, and is open only to freshmen or second-year 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 students in Greek and Latin courses is determined by examinations given by the Department of Classics during orientation week. For details concerning these examinations, contact the director of undergraduate studies. Satisfying the College Language Requirements with Ancient Greek or Latin
Greek: option 1 is satisfied by taking CLASS 201 or above; option 2 is satisfied by taking either CLASS 101, 102, and 104 or CLASS 103 and 104.
Latin: option 1 is satisfied by taking CLASS 205 or above; option 2 is satisfied by taking either CLASS 105, 106, and 109 or CLASS 107 and 109.
Language courses at the 100 level are offered for letter grades only. S-U grades are available at the 200 level only under extraordinary circumstances. Students with fluency in Greek or Latin may satisfy option 1 with an advanced course appropriate to their background and interest; contact the director of undergraduate studies for further information. Modern Greek is offered by the Department of Near Eastern Studies. Contact NES for more information.

Freshman 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 travel in Europe or the Near East. Interested juniors should consult the director of undergraduate studies.

Classical Civilization

[CLASS 170 Word Power: Greek and Latin Elements in the English Language
This course gives the student with no knowledge of the classical languages an understanding of how the Greek and Latin elements that make up over half our English vocabulary operate in both literary and scientific English usage. Attention is paid to how words acquire their meaning and to enlarging each student’s working knowledge of vocabulary and grammar.

[CLASS 171 English Words: Histories and Myths (also LING 105) # (III) (HA)
For description, see LING 109.]

CLASS 211 The Greek Experience # (IV)
(CA)
Fall. 3 credits. Limited to 50 students. F. Ahl.
An 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 212 The Roman Experience # (IV)
(CA)
Spring. 3 credits. Limited to 50 students. D. Mankin.
This course is intended especially for freshmen and sophomores. It is open to all interested students and is intended to convey an idea of the spirit of the Romans as expressed in their literature, religion, and social and political institutions.

CLASS 217 Initiation to Greek Culture # (IV) (LA)
Fall. 4 credits. Limited to 18 students. P. Pucci and L. Abe.
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. Our 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.
We inquire into the development of philosophy in the context of a culture infused with traditional, mythological accounts of the cosmos. We ask how poetic forms such as tragedy responded to and made an accommodation with philosophical discourse while creating a most emotional effect on the audience; how the first historians, using literary and philosophical discourse, created space for their own inquiry, and we discuss how these issues persist and are formulated in our own thinking.

[CLASS 222 Ancient Fiction # (IV)
Fall. 3 credits. All readings are in English. Not offered 2004–2005.]

[CLASS 223 The Comic Theater (also COM L 223 and THETR 223) # (IV) (LA)
The origins of comic drama in ancient Greece and Rome, and its subsequent incarnations especially in the Italian renaissance (Commedia eredita and Commedia dell’arte), Elizabethan England, seventeenth-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 (black humor, caricature); and the role of comedy in society. All readings in English.]

[CLASS 229 War and Peace in Greece and Rome (also HIST 228) # (III or IV)
For description, see HIST 228.]

[CLASS 231 Ancient Philosophy (also PHIL 211) # (IV) (RCM)
Fall. 4 credits. J. Rusten.
For description, see PHIL 211.

[CLASS 234 Seminar: Eyewitness to War in the Ancient World (also HIST 232) # (III or IV) (HA)
A study of ancient soldier-historians who participated in the campaigns about which they later wrote. Topics include historicity, autobiography, propaganda, prose style. Readings include selections from Thucydides, Xenophon, Julius Caesar, Josephus, Ammianus Marcellinus as well as, for comparative purposes, modern soldier-historians.]

[CLASS 236 Greek Mythology (also COM L 236) # (IV) (LA)
Fall. 3 credits. Limited to 200 students. D. Mankin.
A 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.
Greek religion constitutes one of the essential features of ancient Greek civilization and distinguishes it from later Western civilization. Since religious beliefs are part of Greek culture, including the major art forms (epic poetry, tragedy, comedy, architecture, painting, and sculpture), the course investigates the interaction of religion with these forms—an investigation that is fruitful both for the understanding of Greek religion and the forms themselves, some of which, like tragedy, originated in cult. A representative variety of cults and their history are studied with special emphasis on mystery cults, such as the Eleusinian mysteries of Demeter and Persephone, the Kabiri, the Great Gods of Samothrace, and Bacchic rites.

The Ancient Epic and Mystery Cults with top university professors. Special emphasis is given to strong thinking that knowledge. Enrollment is limited to 15.

[GCLASS 220] The Ancient Epic and Beyond (IV) (LA)
K. Clinton.
We move, Odysseus-like, to the West, beginning with Homer's Iliad and Odyssey, we continue in the Hellenistic and Augustan eras with Apollonius of Rhodes' Argonautica and Virgil's Aeneid. A shift in space and time has as its consequences two influential epics: Herman Melville's Moby Dick and Derek Walcott's Omeros.

[GCLASS 244] Sophomore Seminar: Psyche, Ego, and Self (IV) (KCM)
C. Britain and H. Pellecchia.
It is often claimed that the ancient Greeks lacked the "modern Western conception of the self," and its subsequent development was partly a result of the emergence of more introspective literary genres, such as autobiography (e.g., Augustine's Confessions). We examine the evidence for these claims in a variety of philosophical, literary, and psychological sources. Our starting point is the ancient Greek conceptions of soul or psyche, especially as these conceptions manifest themselves in decision-making. We move from Herodotus and Plato (5th–4th C. B.C.E.) to St. Augustine (4th–5th C. C.E.), and end with early modern European especially Cartesian conceptions of the ego. Special attention is paid to the influence of a work's literary genre upon the representation of self in it and to self-preservation as a function of rhetoric. Selected readings come from Herodotus, Euripides, Plato, Aristotle, Augustine, Descartes, and a variety of contemporary authors (philosophical, anthropological, and psychological).

This is a special seminar sponsored by the John S. Knight Institutes Sophomore Seminars Program. Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminaries aim at initiating students into the disciplines outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

[GCLASS 258] Periclean Athens # (IV) (HA)
H. R. Rawlings III.
The first five weeks provide a synoptic view of Athens' historical and cultural achievement in the middle of the fifth century B.C.E.—the traditional pinnacle of "The Glory that was Greece." Readings are taken from Greek historians, philosophers, poets, and documentary texts. At least two of the (75-minute) lectures are devoted to art history and delivered by a guest speaker. The next 7–8 weeks follow the course of the Peloponnesian War to its end. Readings from Thucydides are interspersed with contemporary texts composed by the dramatists (Sophocles, Euripides, and Aristophanes) and the sophists (supplemented with readings from Plato). The remaining weeks 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 are weekly discussion sections.

[GCLASS 260] Conceptions of the Self in Classical Antiquity, # (IV) (KCM)
Spring. 4 credits. There are no prerequisites for this course; all readings are in English. Not offered 2004–2005.
C. Britain.
The idea of a person or a "self" seems to be something determined by nature: we each have one mind, a unique personality, and the capacity to act as moral agents. But the way in which we conceive of ourselves also depends on our culture (our human nature, rationality, freedom, luck, and society). This course examines a variety of very different conceptions of the self from the period 700 B.C.E. to 400 C.E., using a range of texts from Greek and Roman literature (including epic and tragedy), medical theory, and philosophy (both pagan and Christian).

[GCLASS 265] Ancient Greece from Homer to Alexander the Great (also HIST 265) # (III) (HA)
H. Strauss.
For description, see HIST 265.

[GCLASS 267] History of Rome I (also HIST 267) # (III) (CA)
Fall. 4 credits. Open to freshmen.
E. Rebillard.
Rome's beginnings and the Roman Republic. A general introduction to Roman history from the foundation of the city in the middle of the eighth century B.C. to the end of the Republic (31 B.C.). The course is the first part of a two-term survey of Roman history up to the deposition of the last Roman emperor in the West (A.D. 476). We will examine 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 achievement.

[GCLASS 268] History of Rome II (also HIST 268) # (III)
Spring. 4 credits. Open to freshmen.
E. Rebillard.
Roman History II: the Roman Empire. This course, the second part of a two-term survey of Roman history, will examine the history of the Roman Empire from the beginning of the Augustan Principate (31 B.C.) to the fall of the Western Empire in the fifth century (A.D. 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 A.D.

[GCLASS 293] Classical Indian Narrative (also ASIAN 291) # (IV) (KCM)
C. Mintowski.

[GCLASS 331] Goths, Vandals, Franks, and Romans # (IV) (CA)
F. Staff.
Contemporary views of the Visigothic sack of Rome by Alaric in 410 are followed by three different case-studies for co-existence of Roman and barbarian in late Antiquity: the Vandal kingdom (North Africa), the Ostrogothic kingdom (Italy), and finally the one that lasted, the Frankish kingdom (Gaul). Readings include contemporary primary works as well as modern historiography.

[GCLASS 333] Greek and Roman Mystery Cults and Early Christianity (also RELST 333) # (IV) (CA)
Fall. 4 credits. A previous course in classics (civilization or language) or RELST 101 is recommended. Not offered 2004–2005.
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 focuses on the Hellenistic and Roman cults as the mystery cults of Isis, Bacchus, Mithras, and Attis and the Great Mother and on the distinctive features that contributed to their success. Discussion of Christian liturgy and beliefs 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.

[GCLASS 334] Christianity and Classical Culture # (IV) (HA)
F. Staff.
A cultural historical sampler of relations between pagans and Christians in the second to fifth centuries A.D. It will be divided into modules dealing with topics that will include Christian apologetics, martyrdom and persecution, the new Christian literature, public cult and asceticism, and Christianity and the great invasions.

[GCLASS 339] Plato (also PHIL 309) # (IV) (KCM)
Fall. 4 credits. Prerequisite: at least 1 previous course in philosophy. Not offered 2004–2005.
G. Fine.
For description, see PHIL 309.

[GCLASS 340] Aristotle (also PHIIL 310) # (IV) (KCM)
F. Staff.
Aristotle's practical and productive works (his Ethics, Politics, Poetics, and Biology), with attention to their grounding in his theoretical works.

[GCLASS 341] Hellenistic Philosophy (also PHIL 308) (IV) (KCM)
Fall. 4 credits. Prerequisite: CLASS 231 or one philosophy course. Not offered 2004–2005.
G. Fine.
Studies the philosophical developments of the Hellenistic period (c. 321–45 B.C.E.), which were in part a reaction to Plato and Aristotle. The focus will be on the systematic doctrines and arguments of the Stoics and Epicureans, particularly their epistemologies and ethical theories, and the Stoics' responses to them. We will also look at some relevant developments in medical theory. Topics will
include scepticism, the psychology of action, theories of language, concept development, and scientific epistemologies. Since most of the work of the Hellenistic philosophers is only available to us through either 'fragments' or reports in later texts, we will need to think to some degree about the appropriate methods for reconstructing this recently rediscovered—and influential (e.g., on seventeenth-century philosophers such as Descartes and Locke)—part of the history of philosophy.

CLASS 345 The Tragic Theater (also COM L 344 and THEATR 345) (LA) Fall. 4 credits. Limited to 40 students. F. Ahl. Tragedy and its audiences from ancient Greece to modern theater and film. Topics: origins of theatrical conventions; Shakespeare and Seneca; tragedy in modern theater and film. Works studied will include: Aeschylus' Agamemnon; Sophocles' Oedipus Tyrannus; Philoctetes; Euripides Alcestis, Helen; Iphigenie auf Tauris; Seneca's Thyestes; Trojan Women; Shakespeare's Julius Caesar; Titus Andronicus; Othello; Strindberg's The Father; Dürrenmatt's The Visit; Bergman's Seventh Seal; Cacosvanis' Iphigeniea.


CLASS 357 Ancient Athens and Sparta (HA) Spring. 4 credits. L. Abel. Herodotus and Thucydides tell us much of what we know about Athens and Sparta in the sixth and fifth centuries B.C.—about the development, flourishing, and disastrous conflict of these two very different emblematic city-states. We will read Herodotus and Thucydides in English translation, compare what they tell us with other evidence (including Aristotle's), and analyze their narratives as historical, historiographical, and literary texts. We will attend to how these formative thinkers and writers created an authoritative version of events.

CLASS 359 Classical Indian Philosophical Systems (also ASIAN 395 and RELIG 395) (IV) (KCM) Spring. 4 credits. Prerequisite: some background in philosophy or in classical Indian culture. Not offered 2004–2005. C. Minkowski. For description, see ASIAN 395.

CLASS 442 Topics in Ancient Philosophy (also PHIL 442) (IV) (KCM) Fall. 4 credits. What classical philosophy. A. Carpenter. Mind, self, and psychopathology in ancient philosophy.

CLASS 445 Classic Modern Historiography of Ancient Greece (also HIST 435) (III) Fall. 4 credits. Prerequisite: an introductory course in ancient Greek history or civilization or permission of the instructor. Not offered 2004–2005. B. Strauss. This upper-level seminar is an introduction to some of the main themes, directions, and controversies in modern research on ancient Greece. We read selections from the leading works of scholarship on ancient Greece from the nineteenth and twentieth century, including such authors as Grene, Burkhardt, Corin, Grosz, Moniggiano, M. I. Finley, Ste. Croix, Vernant, Vidal-Naquet, and the current crop of scholars.

CLASS 450 The Peloponnesian War (also CLASS 632 and HIST 450/630) (III) Fall. 4 credits. Prerequisites: CLASS 211 or 217; HIST 265, or permission of instructor. Not offered 2004–2005. B. Strauss. For description, see HIST 450.


CLASS 469 Equality and Inequality in Ancient Greece (also HIST 469) (II or IV) Fall. 4 credits. Prerequisite: HIST 265, CLASS 211 or 217, or written permission of the instructor. Not offered 2004–2005. B. Strauss. For description, see HIST 469.

CLASS 632 Topics in Ancient History: Pagan, Jewish, and Christian Apologetics in the First to Third Centuries A.D. (also HIST 632) (NA) Spring. 4 credits. E. Rebillard. As a consequence of religious pluralism in the Roman empire there emerged the practice of writing religious apologies against actual or perceived opponents. We study a variety of selected texts by Josephus, Philo, Justin, Aristides, Minucius Felix, Tertullian, Philastatus, Origen, and Lactantius, focusing on the rhetorical construction of identity and competing theologies and constructions with what we can learn from other evidence.

CLASS 641 Graduate Seminar: Ancient Drama and Epigraphy Spring. 4 credits. W. Slater. The study of Greek and Latin inscriptions illustrates directly how the theatre culture of antiquity was embedded in society. We consider (mostly non-Athenian) festivals, financing, prizes, changing tastes, private and popular culture, and the strong connections to euripent and patronage.

CLASS 700 Doctoral Dissertation Research Fall and spring. 0 credit. Letter grade only. Staff.

CLASS 703 Independent Study for Graduate Students in Classical Civilization Fall and spring. Up to 4 credits. Was CLASS 711–712.

Greek

CLASS 101 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.

CLASS 102 Elementary Ancient Greek II Spring. 4 credits. Provides language qualification. Prerequisite: 101 or equivalent. Was CLASS 103. J. Rusten. A continuation of CLASS 101. prepares students for CLASS 104.

CLASS 103 Intensive Greek Summer. 6 credits. Provides language qualification. Was CLASS 104. Staff. An 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 CLASS 104.

CLASS 104 Elementary Ancient Greek III Fall. 3 credits. Provides language qualification. Prerequisites: CLASS 102, 103, or placement by departmental exam. Was CLASS 201 Intermediate Ancient Greek. H. Rawlings III. Introduces students to reading Greek literary texts (Xenophon's Anabasis) and a dialogue of Plato. The course covers complex syntax and reviews the grammar presented in CLASS 102 or 103.

CLASS 197–198 Elementary Modern Greek I and II (also NES 121-122) Fall (197), spring (198). 4 credits each term. Limited to 15 students. M. Hnaraki. For description, see NES 121–122.

CLASS 199/298 Intermediate Modern Greek (also NES 127-128) Fall (199), spring (298). 4 credits each term. M. Hnaraki. For description, see NES 127–128.


CLASS 203 Homer # (IV) (LA) Spring. 3 credits. Satisfies Option 1. Prerequisite: CLASS 104. D. Mankin. Readings in the Homeric epic.

CLASS 204 Euripides: Alcestis Fall. 3 credits. P. Pucci. With Alcestis, we encounter Greek tragedy in one of its Euripidean versions: serious events and comic happenings interface and weave a most mysterious analysis of human responses to death, to marriage, to myth. The text has no long choruses and therefore is easier for students with limited experience of Greek. This is a wonderful introduction to Greek Tragedy.
CLASS 301 Greek Epic
Spring. 4 credits. P. Pucci.
Undergraduate Seminar. This course focuses on the epic language; its specificity, its poetic means (e.g. epithets, formulae, and similes); its function in constructing and interpreting the world; and its aesthetic, emotional effects. The basic text we will follow is the Odyssey.

CLASS 302 Greek Historiography and Oratory # (LA)
Undergraduate seminar. Topic: the historiography and oratory of fifth-century Athenian democracy and imperialism. Reading in English: Aristotle’s Constitution of the Athenians; in Greek, selections from Herodotus and Thucydides and a speech of Lysias.

CLASS 303 Undergraduate Seminar: Greek Drama (LA)
Topic: Sophocles.

CLASS 304 Greek Philosophy and Rhetoric: Plato and the Orators (LA)
Fall. 4 credits. Prerequisite: One 200-level Greek course. P. Pucci.
Intermediate course. The course will examine Greek rhetoric through readings in Plato’s Gorgias and in several orators, including Lysias and Bocrotos. We will discuss the purposes and the nature of rhetoric, its proponents and detractors, and its origins and early development.

CLASS 310 Special Topics in Greek Literature # (IV)
Fall and spring. 4 credits. Satisfies Option 1. Prerequisite: two 200-level courses in Greek or permission of instructor. Not offered 2004–2005.

CLASS 316 Greek Prose Composition (IV)
Spring. 4 credits. Satisfies Option 1. Prerequisite: CLASS 104. P. Pucci.

CLASS 319 The Greek New Testament and Early Christian Literature # (IV) (LA)
Fall. 4 credits. Satisfies Option 1. Prerequisite: CLASS 104 or equivalent, or permission of instructor. Was CLASS 305. Not offered 2004–2005. Staff.
More advanced readings from the Acts of the Apostles and some exercises on the Gospels are followed by readings from Early Christian Greek literature. The latter may include theological tracts and hagiographical texts, e.g. martyr-acts, such as the Passion of Pionius or the Passion of Perpetua.

CLASS 305 Independent Study in Greek, Undergraduate Level
Fall and spring. Up to 4 credits. Only by permission of the DUS in the case of documented schedule conflict. Was CLASS 225–226 and 307–308. Staff.

CLASS 417 Advanced Readings in Greek Literature (IV) (LA)
Fall. 4 credits. J. Rusten.
Topic: Aristophanes and Menander. Achilleides, Birds, Thesmophoriazusae. Protag, and Dyskolos read entirely, extensive selections from others. Topics include the precursors of comedy in sixth-century Athens, comic competitions, metrical structure, manuscript tradition, “middle comedy”; (for Aristophanes) politics, paratragedy, misogyny; and (for Menander) the dynamics of the family, the figure of the mercenary soldier; and (in translation) Roman adaptations.

CLASS 418 Advanced Readings in Greek Literature # (IV) (LA)
Spring. 4 credits. K. Clinton.

CLASS 419 Advanced Greek Composition (IV) (LA)
Spring. 4 credits. Prerequisite: CLASS 316 or equivalent. Not offered 2004–2005. Staff.

CLASS 421 Greek Comparative Grammar (also LING 451) (III) (KCM)

CLASS 427 Homeric Philology (also LING 457) (III) (LA)
The prehistory and evolution of the sounds and forms of ancient Greeks as reconstructed by comparison with the other Indo-European languages.

CLASS 454 Graduate TA Training
Fall and spring; 1 credit. Staff. Pedagogical instruction and course coordination. Required for all graduate student teachers of CLASS (Latin) 105–106 and Classics First-Year Writing Seminars.

CLASS 555 Graduate Proseminar
Graduate students are introduced to the tools, techniques, and methods of classical scholarship.

CLASS 605–606 Graduate Survey of Greek Literature
605, fall; 606, spring. 4 credits each term. Prerequisite: linguistic proficiency to be determined by instructor. Fall, K. Clinton; spring, H. Pelliccia.
A survey of Greek literature in two semesters. CLASS 605: Greek literature from Homer to the mid-fifth century. CLASS 606: Greek literature from the late fifth century to the Empire.

CLASS 611 Greek Philosophical Texts (also PHIL 411)
Fall and spring; up to 4 credits. Prerequisites: knowledge of Greek and permission of instructor. Was CLASS 511. C. Brittain and T. Irwin.
Readings of Greek philosophical texts in the original.

CLASS 671 Graduate Seminar in Greek

CLASS 672 Graduate Seminar in Greek

CLASS 701 Independent Study for Graduate Students in Greek
Fall and spring. Up to 4 credits. Was CLASS 701–702.

Latin

CLASS 105 Elementary Latin I
Fall. 4 credits. Staff.
An introductory course designed to prepare students to start reading Latin prose at the end of a year. The class moves swiftly and meets daily. Work includes extensive memorization of vocabulary and paradigms; study of Latin syntax; and written homework, quizzes, tests, and oral drills.

CLASS 106 Elementary Latin II
Spring. 4 credits. Provides language qualification. Prerequisite: 105 or equivalent. Staff.
A continuation of CLASS 105, using readings from various authors; prepares students for CLASS 109.

CLASS 107 Intensive Latin
Spring and summer; 6 credits. A. Nussbaum.
An intensive introduction that quickly instills the essentials of Latin grammar before progressing to readings in the original Latin. Prepares students in a single semester for CLASS 109. Students must register for CLASS 107 and 107.1.

CLASS 108 Latin in Review
Fall. 4 credits. Provides language qualification. Prerequisite: placement by departmental examination. M. Fontaine.
This course is designed to accommodate students who have had some Latin, but are insufficiently prepared to take 106. It begins with review of some material covered in 105 and then continues with second-term Latin material (106). The class moves swiftly and meets daily. Work includes extensive memorization of vocabulary and paradigms; study of Latin syntax; and written homework, quizzes, tests, and oral drills. Students should be ready for CLASS 205 by the end of the course.

CLASS 109 Elementary Latin III
Fall and spring; 3 credits. Provides language proficiency. Prerequisites: CLASS 106, 107, 108 or placement by departmental exam. Was CLASS 205 Intermediate Latin. Fall, E. Rehillard; spring, K. Clinton.
Introduces students to reading a literary Latin text (Cicero’s Speeches against Catiline). The course covers complex syntax and reviews the grammar presented in CLASS 106, 107, or 108.

CLASS 205 Latin Prose #
Fall. 3 credits. Satisfies Option 1. Prerequisite: CLASS 106, 107, 108 or placement by departmental exam. J. Rusten.
Speeches of Cicero, including (as time allows) the defense of the actor Roscius, the prosecution of the provincial governor Verres, and the abuse of Marcus Antonius (Philippics).

CLASS 206 Ovid: Erotic Poetry # (IV) (LA)
Spring. 3 credits. Satisfies Option 1. Prerequisites: CLASS 109, 205, or placement by department exam. Not offered 2004–2005. Staff.
Ovid’s erotic poetry is relatively easy to translate but rich in its literary structure and influence.

CLASS 207 Catullus # (IV) (LA)
Fall. 3 credits. Satisfies Option 1. Prerequisite: CLASS 109. C. Sogno.
The aim of this course is to present the poems of Catullus within their cultural and historical context. The poems will be read and translated, and their significance both individually and as products of Late Roman Republican culture discussed in class. Selections from the works of Catullus's contemporaries will be assigned in translation.

[CCLASS 208 Roman Drama # (IV) (LA)]

[CCLASS 209 Vergil # (IV) (LA)]
Spring. 3 credits. Satisfies Option 1. Prerequisite: CLASS 199. Was CLASS 216. M. Fontaine.

[CCLASS 210 Roman Letters]
Spring. 3 credits. C. Sogno.
The course offers an overview of prose letter-writing in the Late Republic and Empire. Selections from the correspondence of Cicero, Seneca, and Pliny are read, translated, and discussed in class. Authorial biases and competing literary styles, scholarly methods, and historical context in which the letters were written.

[CCLASS 306 Undergraduate Latin Seminar: Roman Epic]

[CCLASS 307 Roman Historiography # (III or IV) (CA)]
This course focuses on Roman historiography through close readings of the authors Sallust, Livy, and Tacitus, with some attention paid to Caesar and the fragmentary historians. Principal objectives include analysis of competing literary styles, scholarly methods, and authorial biases. Special emphasis is placed on the development of historical writing over time.

[CCLASS 308 Roman Poetry: Vergil, Eclogues and Georgics (LA)]
Fall. 3 credits. Satisfies Option 1. Prerequisite: One 200-level course in Latin. K. Clinton.
Undergraduate Seminar.

[CCLASS 309 Undergraduate Latin Seminar: Roman Prose # (IV)]
Fall. 3 credits. Satisfies Option 1. Prerequisite: one 200-level Latin class. Not offered 2004–2005. Staff.
Topic yet to be determined.

[CCLASS 312 Latin Undergraduate Seminar # (IV) (LA)]

[CCLASS 317 Latin Prose Composition #]
Fall. 4 credits. Satisfies Option 1. Prerequisite: 1 term of 200-level Latin. D. Mankin.

[CCLASS 369 Intensive Medieval Latin Reading # (IV) (LA)]
Web site: www.classics.cornell.edu/graduate/Courses/Classes/369/med_Latin.html

[CCLASS 386 Independent Study in Latin, Undergraduate Level]
Fall and spring. Up to 4 credits. Only by permission of the instructor. Was CLASS 227–228. Staff.

[CCLASS 411 Advanced Readings in Latin Literature # (IV) (LA)]

[CCLASS 412 Advanced Readings in Latin Literature # (IV) (LA)]

[CCLASS 414 Advanced Latin Prose Composition (IV)]
Spring. 4 credits. For graduate students. Only those undergraduates who have completed CLASS 317 and have permission of the instructor may enroll. Was CLASS 411. Not offered 2004–2005. Staff.

[CCLASS 555 Graduate Proseminar]
Graduate students are introduced to the tools, techniques, and methods of Classical scholarship.

[CCLASS 603 Later Latin Literature: Late Antiquity and Medieval Magicography]

[CCLASS 625-626 Graduate Survey of Latin Literature]
625 fall; 626 spring. 4 credits each term. Prerequisite: at least 1 term of 300-level Latin or permission of instructor. Not offered 2004–2005. Staff.

A survey of Latin literature in two semesters.

[CCLASS 679 Graduate Seminar in Latin: Plautus and Terence]
Fall. 4 credits. M. Fontaine.
A close investigation of selected plays from the Republican comedians Plautus and Terence. Special attention is paid to meter, language, performance criticism, and historical context in which the plays were written.

[CCLASS 680 Graduate Seminar in Latin]

[CCLASS 702 Independent Study for Graduate Students in Latin]
Fall and spring. Up to 4 credits. Was CLASS 751–752. Staff.

Classical Art and Archaeology

[CCLASS 220 Introduction to Art History: The Classical World (also ARKEO 220) # (IV) (HA)]
Fall. 4 credits. Each student must enroll in a section. A. Ramage.
An overview of the art and archaeology of the Greek and Roman world.

[CCLASS 221 Minoan-Mycenaean Art and Archaeology (also ARKEO 221) # (IV) (CA)]
Spring. 3 credits. J. Coleman.
The birth of civilization in Greece and the Aegean islands during the Bronze Age. The main focus is on the rise and fall of Minoan Crete and Mycenaean Greece, with consideration given to the nature and significance of Aegean interactions with Egypt, the Near East, and Anatolia.

[CCLASS 232 Archaeology in Action I (also ARKEO 232 and ART H 224) # (IV)]
5 credits. Prerequisite: permission of instructor. P. I. Kuniholm.

[CCLASS 233 Archaeology in Action II (also ARKEO 233 and ART H 225) # (IV)]
For description, see ART H 225.

[CCLASS 240 Greek Art and Archaeology (also ARKEO 256) (III or IV) (CA)]
An introduction to the aims and methods of field archaeology. Topics covered include remote sensing (satellite images and aerial photos); surface survey; subsurface investigations by magnetometer; ground penetrating radar; the layout and development of a land excavation; underwater excavations; the collection, description, illustration, and analysis of artifacts and data, such as pottery, lithics, botanical samples, and radiocarbon samples. Hands-on experience with potsherds and other artifacts from prehistoric and Classical Greece and Cyprus in the university's collections is intended to prepare students for work in the field.

[CCLASS 321 Mycenae and Homer (also ARKEO 321 and ART H 321) # (IV) (HA)]
Fall. 4 credits. Prerequisite: at least 1 previous course in archaeology, classics, or history of art. Not offered 2004–2005. J. Coleman.
Study of the relationship between the Mycenaean period of Greece (known primarily from archaeology) and the Homeric Iliad and Odyssey. Topics include Mycenaean architecture, burial customs, kingship, and military activities; the reasons for the collapse of the Bronze Age palatial economies; the archaeological evidence for society in the "Dark Ages" that followed; the writing systems of Mycenaean Greece (Linear B) and the Iron Age (the Semitic/Greek alphabet); the nature of the Homeric poems and their value as historical sources.

[CCLASS 322 Greeks and Their Neighbors (also ARKEO 322) # (IV)]
Fall. 4 credits. Prerequisite: CLASS 220 or 221, or permission of instructor. Not offered 2004–2005. J. Coleman.
The relationship of Mycenaean civilization to its neighbors in the eastern Mediterranean. The course covers Classical Greece from召000 BC until the end of the Roman period.
A study of the archaeological and other evidence for the interaction between Greek civilization and the peoples of the eastern and western Mediterranean from the thirteenth to the fourth centuries B.C.E. The course focuses on Greek relationships with Egypt, Phoenicia, Cyprus, Anatolia, and Italy in the post-Bronze Age period.

CLASS 324  Art in the Daily Life of Greece and Rome (also ART H 319) (IV)
For description, see ART H 319.

CLASS 325  Greek Vase Painting (also ART H 325) (IV) (LA)
Spring. 4 credits. A. Ramage.
For description, see ART H 325.

CLASS 327  Greek and Roman Coins (also ART H 327) (IV) (LA)
An examination of ancient Greek sculpture, both three-dimensional and two-dimensional, from the Archaic to the Hellenistic period. Aspects of the works studied include technological advances, changing ideology of the sculptors, regionalism of styles, and taste of individual patrons.

CLASS 330  Dendrochronology of the Aegean (also ARKEO 309 and ART H 309) (IV) (HA)
Fall and spring. 4 credits. Prerequisite: permission of instructor. Letter grade only. Limited to 10 students. Was CLASS 309. P. I. Kuniholm.
For description, see ART H 309.

CLASS 350  Arts of the Roman Empire (also ART H 322) (IV) (HA)
For description, see ART H 322.

CLASS 430  Seminar on the Bronze Age Architecture of Asia Minor (also ARKEO 425 and ART H 425) (IV)
Spring. 4 credits. P. I. Kuniholm.
For description, see ART H 425.

CLASS 431  Ceramics (also ARKEO 423 and ART H 423) (IV) (CA)
For description, see ART H 423.

CLASS 434  The Rise of Classical Greece (also ARKEO 434 and ART H 434) (IV) (HA)
Spring. 4 credits. Recommended: CLASS 220 or 221, ART H 220 or 221, or permission of instructor. Not offered 2004–2005. P. I. Kuniholm.
For description, see ARKEO 434.

CLASS 435  Seminar on Roman Art and Archaeology (also ARKEO 435 and ART H 427) (IV) (CA)
Spring. 4 credits. Prerequisite: permission of instructor. A. Ramage.
For description, see ART H 427.

CLASS 425  Greek Dialects (also LING 455) (III) (KCM)
The prehistory and development of the sounds and forms of ancient Greek as reconstructed by comparison with the other Indo-European languages.

CLASS 422  Latin Comparative Grammar (also LING 452) (III) (KCM)
Fall. 4 credits. Prerequisite: thorough familiarity with the morphology of Classical Latin. M. Weiss.
The prehistory and evolution of the sounds and forms of Classical Latin as reconstructed by comparison with the other Indo-European languages.

CLASS 421  Greek Comparative Grammar (also LING 451) (III) (KCM)
The prehistory and evolution of the sounds and forms of ancient Greek as reconstructed by comparison with the other Indo-European languages.

CLASS 427  Homeric Philology (also LING 457) (III) (LA)
The language of the Homeric epics: dialect background, archaisms, modernizations. The notion of a "Kunstsprache": its constitution, use, and internal consistency. The phonological and morphological aspects of epic compositional technique.

CLASS 429  Mycenaean Greek (also LING 459) (III) (LA)

CLASS 329  Greek Sculpture (also ART H 327) (IV) (LA)
An examination of ancient Greek sculpture, both three-dimensional and two-dimensional, from the Archaic to the Hellenistic period. Aspects of the works studied include technological advances, changing ideology of the sculptors, regionalism of styles, and taste of individual patrons.

CLASS 429  Mycenaean Greek (also ARKEO 425 and ART H 425) (IV) (HA)
An introduction to the essentials of Sanskrit grammar. Designed to enable the student to read classical and epic Sanskrit as quickly as possible.

CLASS 291–292  Intermediate Sanskrit (also LING 251–252 and SANSK 251–252) (IV)
291, fall; 292, spring. 3 credits each term. CLASS 291 satisfies Option 1 and provides language proficiency. Prerequisite: CLASS 192 or equivalent. Was CLASS 251–252. C. Minkowski.
Readings from the literature of Classical Sanskrit. Fall: selections from the two Sanskrit epics, the Mahabharata and the Ramayana. Spring: more selections from the epics, and from either Sanskrit story literature or from Sanskrit dramas.

CLASS 391  Independent Study in Sanskrit, Undergraduate Level
Fall and spring. Up to 4 credits. Was CLASS 403–404. Staff.

CLASS 704  Independent Study for Graduate Students in Sanskrit
Fall and spring. Up to 4 credits. Was CLASS 703–704. Staff.
Also see: CLASS 293, 390, and 395 (Classical Civilization listings).

Honors Courses

CLASS 472  Honors Course: Senior Essay
Fall and spring. 8 credits. An adviser must be chosen by the end of the student's sixth semester. Topics must be approved by the Standing Committee on Honors by the beginning of the seventh semester. See "Honors," Classics front matter.

Related Courses in Other Departments and Programs
See listings under:
Archaeology
Asian Studies
Comparative Literature
English
History
History of Art
Medieval Studies
Linguistics
Near Eastern Studies
Philosophy
Religious Studies
Society for the Humanities
Women's Studies
COGNITIVE STUDIES PROGRAM
S. Edelman (psychology), director. G. Gay (communication); C. Cardie, R. Constable, J. Halpem, D. Huttenlocher, L. Lee, B. Selman, R. Zabih (computer science); A. Hedge (design and environmental analysis); K. Basu, L. Blume, D. Dimicis, J. Dunn, R. Ripple, D. Schrader (education); S. Wicker (electrical and computer engineering); M. Casasola, S. Ceci, B. Koslowski, B. Lust, S. Robertson, E. Temple, Q. Wang, L. Blume, D. Easley (economics); J. Dunn, M. Casasola, S. Ceci, B. Koslowski, B. Lust, S. Robertson, E. Temple, Q. Wang, L. Blume, D. Easley (economics); J. Dunn, K. Basu, Z. Szabo, J. Whiting (philosophy); the university they are represented in the departments of Computer Science, Economics, Linguistics, Mathematics, Neurobiology and Behavior, Philosophy, Psychology, and Sociology. Elsewhere in the university they are represented in the Departments of Computer Science, Mechanical and Computer Engineering, and Mechanical and Aerospace Engineering (College of Engineering), the Departments of Design and Environmental Analysis and Human Development (College of Human Ecology), the Departments of Communication and Education (College of Agriculture and Life Sciences), and the Johnson Graduate School of Management.

The issues addressed in cognitive studies arise at several levels. At the broadest levels are problems of characterizing such basic notions as “mind,” “knowledge,” “information,” and “meaning.” At a more specific level are questions—abstract operating principles of individual components of the mind, such as those underlying visual perception, language ability, and understanding of concepts. These principles concern the organization and behavior of the components and how they are biologically represented in the brain. At the most specific level are questions about the properties of the elementary computational structures and processes that constitute these components. Important insights into issues of these kinds have been obtained in recent years as a result of the various cognitive studies 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 studies.” Even greater progress can be expected in the future as a consequence of increasing cooperation among the disciplines.

Undergraduate Concentration
An interdisciplinary undergraduate concentration in Cognitive Studies is available to Cornell University undergraduates in the College of Arts and Sciences. Students from other colleges who seek such a concentration should discuss such with the Cognitive Studies office, which will provide information and contacts concerning such concentrations.

The undergraduate concentration in Cognitive Studies is designed to enable students to engage in a structured program directly related to the scientific study of cognition and the mind. The concentration provides a framework for the design of structured, supervised programs of study in this growing interdisciplinary field. Such programs of study serve as components of a 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 concentration. Students majoring in other departments and college scholars may also apply. Colleges vary in their procedures for formal recognition of this concentration (contact the Cognitive Studies office for details). The Cognitive Studies Program faculty have designed five structured “tracks” that offer students different ways of satisfying the concentration. In addition, students are always able to construct their own programs of study subject to approval by their Cognitive Studies adviser. The courses listed under each track are program suggestions. The student should consult with his/her Cognitive Studies adviser 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 concentration will take COGST 101, a lab course such as COGST 201, and three courses at the 300 or 400 level in at least two departments. Even though only five courses are required to complete the concentration, we expect that students interested in cognitive studies will often end up taking more, and we encourage them to do an independent research project (COGST 470) and a research workshop such as COGST 471. The five typical tracks are as follows. The first track involves a particular approach to the study of cognition. The other four tracks are structured around specific content domains and consist of sets of suggested course clusters. Please note that many of these courses have substantial prerequisites.


   Foundational issues in cognitive science are intimately relevant to real world settings. The Cognitive Studies in Context track offers students the opportunity to learn and independently explore how theory and research on the mind can help us better understand how we use information in much of our daily activities, whether it be the workplace, the classroom, or any other aspect of everyday life. Students will come to better understand the cognitive ergonomics of such diverse settings as an aircraft cockpit, a quality control station on an assembly line, or an anesthesia station in a surgical suite. They will come to better understand the perceptual and methodological constraints that help tailor the nature of visual communication systems, or the linguistic constraints that help tailor text-based communication. They will come to see how the functional architecture of human memory guides the presentation and use of information in a wide array of settings. They will also learn how design constraints on computer hardware and software interact with human capacities and biases.

   COGST 101/COM S 101/LING 170/PHIL 191/PSYCH 102, Introduction to Cognitive Science
   COGST 201/COM S 201/PSYCH 201, Cognitive Science in Context Laboratory
   COGST 416/PSYCH 416, Modeling Perception and Cognition

   In addition, three more upper-level approved courses in Cognitive Studies areas will normally be expected.

2. 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.

   COGST 101/COM S 101/LING 170/PHIL 191/PSYCH 102, Introduction to Cognitive Science
   COGST 201/COM S 201/PSYCH 201, Cognitive Science in Context Laboratory
   COGST 214/PSYCH 214, Cognitive Psychology
   COGST 416/PSYCH 416, Modeling Perception and Cognition
   COGST 450/HIL 457/LING 450/PSYCH 437, Lab Course: Language Development
   BIOLN 326, The Visual System
   PSYCH 305, Visual Perception
   PSYCH 516, Auditory Perception
   PSYCH 412, Laboratory in Cognition and Perception
   PSYCH 418, Psychology of Music
   PSYCH 419, Neural Networks Laboratory
   COGST 465/COM S 492/PSYCH 465, Topics in High-Level Vision

3. Language and Cognition

   This track focuses on the representation, processing, and acquisition of language, as well as its role in cognition and culture. Students will acquire skills and knowledge in formal and applied linguistic theory, psycholinguistic experimentation, and computational modeling techniques.

   COGST 101/COM S 101/LING 170/PHIL 191/PSYCH 102, Introduction to Cognitive Science
   COGST 201/COM S 201/PSYCH 201, Cognitive Science in Context Laboratory
   COGST 214/PSYCH 214, Cognitive Psychology
perceptual/cognitive processes, and how they interact.

COGST 101/COM S 101/LING 170/Psych 102, Introduction to Cognitive Science

COGST 102/COM S 201/Psych 201, Cognitive Science in Context Laboratory

COGST 214/Psych 214, Cognitive Psychology

COGST 416/Psych 416, Modeling Perception and Cognition

COGST 450/HD 457/Ling 450/Psych 437, Lab Course: Language Development

Com S 211, Computers and Programming

Com S 212, Structure and Interpretation of Computer Programs

Com S 472, Foundations of Artificial Intelligence

Com S 473, Practicum in Artificial Intelligence

Phil 262, Philosophy of Mind

Phil 362, Philosophy of Mind

Psych 511, Introduction to Human Memory

Psych 412, Laboratory in Cognition and Perception

Psych 413, Information Processing: Conscious and Nonconscious

Psych 415, Concepts, Categories, and Word Meanings

Psych 417, The Origins of Thought and Knowledge

5. 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

A Cognitive Studies undergraduate laboratory and computer facility is available for all students in a Cognitive Studies concentration. This facility will help link resources from different laboratories across the Cornell campus as well as provide a central location for developing and conducting experimental research in cognitive studies.

Students who complete the concentration requirements will have their concentration in Cognitive Studies officially represented on their transcript. In addition, students who have made substantial progress toward completing the requirements for the concentration will be eligible for enrollment in the graduate courses in Cognitive Studies during their senior year.

Concentration Application Procedures.

Initial inquiries concerning the undergraduate concentration should be made to the Cognitive Studies Program coordinator, Linda LeVan, cogst@cornell.edu, 255-6431, who will provide application materials and set up a meeting with a relevant member of the Undergraduate Concentration Committee. This committee will assist the student with selection of a concentration advisor with expertise in the student’s main area of interest.

To formally initiate the concentration in Cognitive Studies, a student must gain approval for a selection of courses from a concentration 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 concentration, the student must submit this plan of study to the Cognitive Studies undergraduate faculty committee for final approval.

In addition to approving the student’s selection of courses, the concentration advisor serves as a general source of information about the field of cognitive studies, relevant resources, and opportunities for advanced undergraduates.

Independent Research. The concentration encourages each student to be involved in independent research that bears on research issues in cognitive studies, if possible.

COGST 470 is available for this purpose. It is recommended that students report on their research activities in an annual undergraduate forum. The Undergraduate Concentration Committee is committed to helping students find an appropriate research placement when needed.

The Committee for Undergraduate Concentration in Cognitive Studies consists of: Bart Selman, computer science, 5-5643, 4144 Upson Hall, selman@cs.cornell.edu; Draga Zec, linguistics, 5-0728, 217 Morrill Hall, DZ17@cornell.edu; Tamar Gendler, philosophy, Goldwin Smith, tamar.gendler@cornell.edu; Michael Owren, psychology, 5-3835, 224 Uris Hall, mjo9@cornell.edu. The current director of undergraduate studies is Draga Zec.

Graduate Minor

Graduate students minoring in Cognitive Studies should take COGST 531. Topics in Cognitive Studies, at some point after taking COGST 501. This is a ‘topics’ course, which focuses on different issues each spring semester, and also is open to advanced undergraduate students.

For more information, consult the program office (282 Uris Hall, 255-6431, cogst@cornell.edu) or the director of graduate studies, Shimon Edelman, 255-6305, se37@cornell.edu.

Courses

COG 501 Introduction to Cognitive Science (also COG S 101, LING 170, PHIL 191, and PSYCH 102) (III) (KCM)

Fall. 3 or 4 credits (the 4-credit option involves a writing section instead of taking exams). M. Spivey.

This course surveys the study of how the mind/brain works. We examine how intelligent information processing can arise from biological and artificial systems. The course 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 of the course 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.

COG 111 Brain, Mind, and Behavior (also BIONB 111 and PSYCH 111) (I) (PBS)

Spring. 3 credits. Letter grade only. Intended for freshmen and sophomores in the humanities and social sciences; seniors not allowed. Not recommended for psychology majors; biology majors may not use the course for credit toward the major. Not offered 2004-2005. R. Höy and E. Adkins-Regan.

Understanding how the brain creates complex human behavior and mental life is a great scientific frontier of the next century. This
course enables students with little scientific background from any college or major to appreciate the excitement. What are the interesting and important questions? How are researchers trying to answer them? What are they discovering? Why did the brain evolve this remarkable capacity?

**COGST 215 Psychology of Language**
*(also LING 215/715 and PSYCH 215/715)*
Spring. 3 credits. Limited to sophomores, juniors, and seniors. Prerequisite: any one course in Psychology or Human Development. M. Christiansen. This course provides an introduction to the psychology of language. The purpose of the course is to introduce students to the scientific study of psycholinguistic phenomena. It 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.

**COGST 220 The Human Brain and Mind: Biological Issues in Human Development**
*(also HD 220)*
Fall. 3 credits. Prerequisite: HD 115, or permission of instructor. E. Temple. What do we know about the biology of the mind? As long ago as the 1600s, when the philosopher Descartes speculated on how the mind and body interact, humans have been fascinated by how the chunk of tissue we call the brain can give rise to all the complexity that is human behavior. This course is designed as an introduction to the biological underlying human behavior. After studying basic concepts in neurobiology and neuroanatomy, the course will explore a variety of topics, such as how the brain reacts to drugs and hormones, and what brain mechanisms underlie seeing, hearing, thinking, talking, feeling, emotions and desires, and dreaming. We will try to understand what is understood (and what is not yet understood) about the biological mechanisms underlying the human experience. In addition, we will discuss the biology of clinical disorders throughout. This course will give background necessary for other courses in HD that focus on biological mechanisms of human development and serves as a prerequisite for many of them.

**COGST 230 Cognitive Development**
*(also HD 230)*
Spring. 3 credits. Prerequisite: HD 115 or PSYCH 101. Not offered 2004–2005. Q. Wang. This course is designed to help students develop a broad understanding of the mechanisms, processes, and current issues in cognitive development and to do critical, in-depth analyses of developmental research. We will discuss 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 will also conduct research experiences with "real" kids.

**COGST 264 Language, Mind, and Brain**
*(also LING 264)*
Spring. 4 credits. Not offered 2004–2005. J. Bowers. An introductory course that emphasizes the formal structural language in the Minimalist framework. The following topics are covered: the formal representation of linguistic knowledge, principles, and parameters of Universal Grammar, the basic biology of language, mechanisms of linguistic performance, the modularity hypothesis, and language and cognition. The course is especially suited for majors in fields such as psychology, philosophy, computer science, and linguistics (and also for those enrolled in the concentration in cognitive studies) who want to take a one-semester introduction to linguistics that concentrates on the formal principles that govern linguistic knowledge, along with some discussion of their biological realization and their use in perception and production.

**COGST 270 Truth and Interpretation**
*(also LING 270 and PHIL 270)*

**COGST 305 Foundations of Linguistics**
*(also LING 305)*
Fall. 4 credits. Prerequisites: LING 101 plus one other linguistics course, or two similar courses in another area of cognitive studies. Not offered 2004–2005. C. Collins. This course will cover foundational issues in linguistic theory, including the nature of linguistic data, poverty of stimuli, autonomy of syntax, different frameworks (including functional linguistics), and the history of linguistics.

**COGST 330 Introduction to Computational Neuroscience**
*(also BIONB 330 and PSYCH 330)*
Fall. 3–4 credits (4 credits includes a laboratory providing additional computer simulation exercises). Limited to 25 students. Prerequisites: BIONB 222 or permission of instructor. Offered alternate years. C. Linster. This course covers the basic ideas and techniques involved in computational neuroscience. The course 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.

**COGST 333 Problems in Semantics—Quantification in Natural Language**
*(also LING 333 and PHIL 333)*
Fall. 3 credits. Prerequisites: a previous course in formal semantics (e.g., LING 421) or logic (e.g., PHIL 231) or permission of instructor. Not offered 2004–2005. S. McConnell-Ginet and Z. G. Szabó. This course looks at problems in the semantic analysis of natural languages, critically examining work in linguistics and philosophy on particular topics of current interest. The focus is on quantification. Languages offer a variety of resources for expressing generalizations: some, every, no, many, and other quantifying expressions that appear inside noun phrases; always, never, occasionally; and other adverbial quantifying expressions not associated with particular nominals; constructional resources of various kinds (e.g., English free relatives like whatever she cooks). How different are these resources and what might they imply about basic cognitive and linguistic capacities?"
COGST 342 Human Perception: Applications to Computer Graphics, Art, and Visual Display (also PSYCH 3420, Visual and VIST 3422) (III)
Fall. 3 or 4 credits. The 4-credit option involves a term paper. Prerequisite: PSYCH 101 or permission of instructor. PSYCH 205 strongly recommended. D. Field.
Our present technology allows us to transmit and display information through a variety of media. To make the most of these media channels, it is important to consider the limitations and abilities of the human observer. The course considers a number of applied aspects of human perception with an emphasis on the display of visual information. Topics covered 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.

COGST 414 Comparative Cognition (also PSYCH 414 and 714) (III) (KCM)
Spring. 3 or 4 credits. The 4-credit option involves an annotated bibliography or creating a relevant web site. Prerequisites: PSYCH 205, 223, or permission of instructor. M. Owren.
This course examines some of the conceptual and empirical work resulting from and fueling the recent surge of interest in animals' thinking. 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 signing 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.

COGST 416 Modeling Perception and Cognition (also PSYCH 416 and 613) (III)
Spring. 4 credits. Prerequisites: PSYCH 205, 209, 214, or 215, or permission of instructor. M. Spivey.
This course offers a survey of several computational approaches to understanding perception and cognition. We explore linear systems analysis, connectionist models, dynamical systems, and production systems, to name a few. Emphasis is placed on how complex sensory information gets represented in these models, as well as how it gets processed. This course 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.

COGST 424 Computational Linguistics (also COM S 324 and LING 424) (II)
Fall. 4 credits. Prerequisite: LING 203. Labs involve work in the Unix environment. COM S 114 is recommended. Not offered 2003-2004. B. Rosser.
Studying patterns in formalisms, algorithms, linguistic knowledge, and computer technology is bringing computational mastery of the syntax, morphology, and phonology of natural languages within reach. The course introduces methods for "doing a language" computationally, with an emphasis on approaches that bridge linguistic knowledge with powerful computational formalisms. Topics include computational grammars, parsing, representation of syntactic analyses; finite state morphology, weighted grammars; feature correspondence formalisms for syntax; treebank and other markup methodology; robust low-level syntactic and semantic; and experimental-modeling methodology using large data samples.

COGST 427 Evolution of Language (also PSYCH 427 and PSYCH 627)
Fall. 3 credits. Prerequisite: permission of instructor. Limited to 20 students. Offered alternate years. Not offered 2004-2005. M. Christiansen.
Fueled by theoretical constraints derived from recent advances in the brain's cognitive sciences, the last decade of the twentieth century saw a resurgence of scientific interest in the evolution of language. This seminar surveys a cross section of modern theories, methods, and presuppositions to the origin and evolution of language. We consider evidence from psychology, the cognitive neurosciences, comparative psychology, and computational modeling of evolutionary processes. Current research and student 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 ontology?

COGST 428 Connectionist Psycholinguistics (also LING 428/628 and PSYCH 428/628) (III)
Fall. 4 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. In this course, we will survey 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 this discussion will be the methodological and theoretical issues related to computational modeling of psychological data. We will furthermore discuss the broader implications of connectionist models of language, not only for psycholinguistics but also for computational and linguistic perspectives on language.

COGST 433 Developmental Cognitive Neuroscience (also HD 433)
Spring. 3 credits. Prerequisite: HD 115 or PSYCH 101 and 1 semester of biology; permission of instructor. Limited to 25. Not offered 2004-2005. E. Temple.
What are the brain mechanisms underlying human behavior and cognition? How do those underlying brain mechanisms develop? These are questions that we will explore in this course through both lecture and reading and discussion of primary literature. The first weeks of class will cover basics of developmental neurobiology and neuroimaging, and methods used in the field of cognitive neuroscience (especially neuroimaging techniques). After the introductory and methods information is covered we will change to a weekly format where there will be in-class discussion of current research papers. Each week we will focus on a particular cognitive ability such as language, memory, attention, or inhibitory control. For each topic we will explore what is known about the brain mechanisms that underlie that particular ability, and how those brain mechanisms develop over the life span, and where possible, the brain mechanisms underlying disorders of that particular cognitive function.

COGST 435 Mind, Self, and Emotion: Research Seminar (also HD 431)
Fall. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HD 436, LING 700, or PSYCH 600. Supplemental graduate seminar. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. S-U grades optional. B. Lust.
This course examines current data and theory concerning memory, emotion, and the development of thinking 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 and emotion, self-construal, and perception of emotion.

COGST 436 Language Development (also HD 436, LING 436, and PSYCH 436) (III) (KCM)
Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HD 435, LING 700, or PSYCH 600. Supplemental graduate seminar. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. S-U grades optional. B. Lust.
This course surveys research on language acquisition, major theoretical positions in the field are considered in the light of experimental studies in 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 notes). Offered on a pass/fail basis. COGST 450/HD 457, LING 450/PSYCH 457.

COGST 437 Thinking and Reasoning (also HD 238)
Fall. 3 credits. Prerequisite: HD 115 or PSYCH 101. B. Koslow.
The course examines problem solving and transfer, pre- logical thinking, logical thinking, practical syllogisms, causal reasoning, scientific reasoning, theories of evidence, expert vs. novice differences, and nonrational reasoning. Two general issues run through the course: the extent to which children and adults approximate the sorts of reasoning that are described by various types of models, and the extent to which various models accurately describe the kind of thinking that is required by the sorts of problems that arise and must be dealt with in the real world.
COGST 438 Minds, Machines, and Intelligence (also S&TS 438) (III) (KCM)

COGST 439 Cognitive Development: Infancy through Adolescence (also HD 439)
Spring. 3 credits. Prerequisite: HD 115 or PSYCH 101. Letter grade only. Not offered 2004–2005.

The course will be an overview of current and classic issues and research in cognitive development. Central topics of both “hard cognition” (e.g., information processing and neuropsychological functioning) and “soft cognition” (e.g., problem solving, concepts, and categories) will be covered. Selected topics will be linked to methodological issues and to important social issues such as cross-cultural cognitive development and putative racial and social class differences.

COGST 450 Lab Course: Language Development (also HD 437, LING 450, and PSYCH 437)
Spring. 2 credits. In conjunction with COGST/HD/LING/PSYCH 436, Language Development. B. Lust.

This laboratory course is an optional supplement to the survey course Language Development (COGST/HD/LING/PSYCH 436). 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 452 Culture and Human Development (also HD 452)

The course 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 differences, 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 465 Topics in High-Level Vision (also COM S 392 and PSYCH 465/466) (III) (KCM)
Spring. 4 credits. Offered alternate years. 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. The 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.

COGST 470 Undergraduate Research in Cognitive Studies
Fall or spring. 1–4 credits. S-U grades optional. Prerequisite: permission of major advisor; written permission of Cognitive Studies faculty member who will supervise the research and assign the grade. Cognitive Studies faculty.

Experience in conducting, and reporting independent laboratory, field, and/or library research in an interdisciplinary area relevant to cognitive studies.

COGST 471 Cognitive Studies Research Workshop
Fall or spring. Credits variable. Prerequisite: student must be enrolled in an independent research course (either in Cognitive Studies, e.g., COGST 470, or in a related department) or in honors thesis research in one of the departments relevant to Cognitive Studies. Staff (interdisciplinary faculty from Cognitive Studies Program).

This course provides a research workshop in which graduate 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 474 Introduction to Natural Language Processing (also COM S 474 and LING 474) (III)
Fall. 4 credits. Not offered every year. M. Booij.

The course presents formalisms, algorithms, and methodology for manipulating natural languages computationally. It emphasizes parts of natural language (syntax and morphology, but not semantics) where algorithms and scientific understanding make it possible for us to create and implement approximately complete accounts of linguistic phenomena and also manipulate large samples of language (million or a billion words). Most of the methods are not only useful for engineering applications but also advance our scientific understanding of human languages.

COGST 476-477 Decision Theory (also COGST 676/677, COM S 576/577, ECON 476/477, and ECON 576/577) (II) (MQR)
Fall and spring. 4 credits each semester. This is a two-semester course. In the fall semester the course is lecture based. Students are required to complete several problem sets and there is a final exam. In the spring semester there are additional lectures as well as visiting speakers. Students will be required to read the speakers' papers and participate in discussions. In the spring semester students are required to 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 has several objectives. First, we cover 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. Second, we consider implications of and problems with this theory. Issues to be discussed here include decision theory paradoxes revealed by experiments, cognitive and knowledge limitations, and computational issues. Third, we cover research designed in response to these difficulties. Issues to be covered here include alternative approaches to the foundations of decision theory, adaptive behavior, and shaping the individual decisions by aggregate/evolutionary forces.

COGST 491 Research Methods in Psychology (also COGST 691 and PSYCH 491/691)
Spring. 4 credits. Enrollment limited to 15 students. Recommended: permission of instructor, PSYCH 350, experience in upper-division psychology courses, or graduate standing. Graduate students see COGST 691. D. Dunning.

An 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

COM S 101 Introduction to Cognitive Science (also COGST 101, LING 170, PHIL 191, and PSYCH 102)
Fall. 3 or 4 credits. M. Spivey.

COM S 172 Computation, Information, and Intelligence (also COGST 172 and ENGR 172)

COM S 201 Cognitive Science in Context Laboratory (also COGST 201 and PSYCH 201)
Spring. 4 credits. D. Field and staff.

COM S 211 Computers and Programming
Fall, spring, or summer. 3 credits.

COM S 312 Data Structures and Functional Programming
Fall or spring. 4 credits.

COM S 324 Computational Linguistics (also COGST 424 and LING 424)

COM S 381 Introduction to Theory of Computing
Fall. Summer. 4 credits.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Term</th>
<th>Instructor(s)</th>
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<tr>
<td>COM S 392</td>
<td>Topics in High-Level Vision (also COGST 465 and PSYCH 465/665)</td>
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<tr>
<td>COM S 411</td>
<td>Programming Languages and Logic</td>
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<tr>
<td>COM S 472</td>
<td>Foundations of Artificial Intelligence</td>
<td>3</td>
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<td>COM S 473</td>
<td>Practicum in Artificial Intelligence</td>
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<tr>
<td>COM S 474</td>
<td>Introduction to Natural Language Processing (also COGST 474 and LING 474)</td>
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<tr>
<td>COM S 478</td>
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<td>COM S 481</td>
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<tr>
<td>COM S 486</td>
<td>Applied Logic (also MATH 486)</td>
<td>4</td>
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**Education (College of Agriculture and Life Sciences)**

| EDUC 411  | Educational Psychology                                                      | 3       | Fall  | D. Schrader   |

**Human Development (College of Human Ecology)**

| HD 115    | Human Development                                                           | 3       | Fall or Summer |               |
| HD 220    | The Human Brain and Mind: Biological Issues in Human Development (also COGST 220) | 3       | Fall  | E. Temple     |
| [HD 230]  | Cognitive Development (also COGST 230)                                       | 3       | Spring | Not offered 2004-2005 Q. Wang |
| HD 238    | Thinking and Reasoning (also COGST 437)                                      | 3       | Fall  | B. Koslowski  |
| HD 266    | Emotional Functions of the Brain                                            | 3       | Spring |               |
| HD 320    | Human Development Neuropsychology                                            | 3       | Spring | B. Koslowski  |
| HD 336    | Connecting Social, Cognitive, and Emotional Development                     | 3       | Fall  | M. Casasola   |
| HD 344    | Infant Behavior and Development                                             | 3       | Fall  | S. Robertson  |
| HD 347    | Human Growth and Development: Biological and Behavioral Interactions (also B&SOC 347 and NS 347) | 3       | Spring | S. Robertson and J. Haas |
| HD 362    | Human Bonding                                                                | 3       | Fall  |               |

**LING 101** | Introduction to Linguistics  || Fall or spring | 4 credits. Fall, C. Rosen, spring, M. Diesing. |
**LING 170** | Introduction to Cognitive Science (also COGST 101, COM S 101, PHIL 191, and PSYCH 102) | 4       | Fall  | 3 or 4 credits. M. Spivey. |
**LING 215** | Psychology of Language (also COGST 215, LING 715, and PSYCH 215/715)        | 3       | Spring | M. Christiansen. |
**LING 264** | Language, Mind, and Brain (also COGST 264)                                  | 4       | Spring | Not offered 2004-2005. J. Bowers |
**LING 270** | Truth and Interpretation (also COGST 270 and PHIL 270)                      | 4       | Spring | Not offered 2004-2005. |
**LING 301** | Introduction to Phonetics                                                    | 4       | Fall  |               |
**LING 302** | Introduction to Phonology                                                    | 4       | Spring | D. Zec.       |
**LING 303** | Introduction to Syntax                                                       | 4       | Fall  |               |
**LING 304** | Introduction to Semantics and Pragmatics                                     | 4       | Spring | M. Diesing.   |
**LING 305** | Foundations of Linguistics (also COGST 306)                                 | 4       | Fall  | Not offered 2004-2005. C. Collins. |
**LING 332** | Philosophy of Language (also PHIL 332)                                       | 4       | Fall  | 3 credits. Z. Szabo. |
**LING 400** | Language Typology                                                            | 4       | Fall  | C. Rosen.     |

**LING 401-402** | Phonology I, II  || Fall and spring | 4 credits each term. Fall, A. Cohn; spring, D. Zec. |
**LING 403-404** | Syntax I, II  || Fall and spring | 4 credits each term. Fall, J. Bowers; spring, M. Diesing. |
**LING 414** | Second Language Acquisition I (also ASIAN 414)                             | 4       | Spring | Not offered 2004-2005. Y. Shirai. |
**LING 415** | Second Language Acquisition II (also ASIAN 417)                             | 4       | Spring | Not offered 2004-2005. Y. Shirai. |
**LING 419** | Phonetics I                                                                  | 4       | Fall  | S. Hertz.     |
**LING 420** | Phonetics II                                                                 | 4       | Spring | Not offered 2004-2005. |
**LING 421** | Semantics I                                                                  | 4       | Spring | M. Rooth.     |
**LING 422** | Semantics II                                                                 | 4       | Fall  |               |
**LING 423** | Morphology                                                                   | 4       | Spring |               |
**LING 428** | Connectionist Psycholinguistics (also COGST 428, LING 628 and PSYCH 428/628) | 3       | Fall  | Offered alternate years M. Christiansen. |
**LING 436** | Language Development (also COGST 436, HD 436, and PSYCH 436)                | 4       | Spring | B. Lust.     |
**LING 450** | Lab Course: Language Development (also COGST 450, HD 437, and PSYCH 437)    | 2       | Spring | In conjunction with COGST/HD/LING/PSYCH 436, Language Development B. Lust. |
**LING 474** | Introduction to Natural Language Processing (also COGST 474 and COM S 474)  | 4       | Fall  | Not offered every year. M. Rooth. |

**Mathematics**

**MATH 281** | Deductive Logic (also PHIL 331)                                             | 4       | Fall  |               |
**[MATH 481]** | Mathematical Logic (also PHIL 431)                                          | 4       | Spring | Not offered 2004-2005. |
**MATH 482** | Topics in Logic (also PHIL 432)                                             | 4       | Spring | H. Hodes.     |
**[MATH 483]** | Intensional Logic (also PHIL 436)                                           | 4       | Spring | Not offered 2004-2005. |
**MATH 486** | Applied Logic (also COM S 486)                                              | 4       | Spring |               |
Neurobiology and Behavior

[BIONB 111] Brain, Mind, and Behavior (also COGST 111 and PSYCH 111)

[BIONB 221] Neurobiology and Behavior I: Introduction to Behavior
Fall. 3 or 4 credits.

[BIONB 222] Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits.

[BIONB 326] The Visual System

[BIONB 328] Biopsychology of Learning and Memory (also PSYCH 332)
Spring. 3 credits. T. DeVoorogd.

[BIONB 330] Introduction to Computational Neuroscience (also COGST 330 and PSYCH 330)
Fall. 3–4 credits. C. Linster.

[BIONB 392] Drugs and the Brain

[BIONB 396] Introduction to Sensory Systems (also PSYCH 396)

[BIONB 421] Effects of Aging on Sensory and Perceptual Systems (also PSYCH 431 and PSYCH 631)
Fall. 3 or 4 credits. B. Halpern.

[BIONB 424] Neurolinguistics (also PSYCH 424)

[BIONB 426] Animal Communication

[BIONB 492] Sensory Function (also PSYCH 492/492 and VISST 492)

[BIONB 496] Bioacoustic Signals in Animals and Man

Philosophy

PHIL 191 Introduction to Cognitive Science (also COGST 101, COM S 101, LING 170, and PSYCH 102)
Fall. 3 or 4 credits. M. Spivey.

PHIL 231 Introduction to Deductive Logic
Fall and spring. 4 credits.

PHIL 261 Knowledge and Reality
Spring. 4 credits.

PHIL 262 Introduction to Philosophy of Mind
Fall. 4 credits.

PHIL 270 Truth and Interpretation (also COGST 270 and LING 270)

PHIL 286 Science and Human Nature (also S&TS 286)
Spring. 4 credits. R. Boyd.

PHIL 318 Twentieth-Century Philosophy

PHIL 331 Deductive Logic (also MATH 281)
Fall. 4 credits. H. Hodes.

PHIL 332 Philosophy of Language (also LING 332)
Fall. 4 credits. Z. Szabo.

PHIL 333 Problems in Semantics—Quantification in Natural Language (also COGST 333 and LING 333)

PHIL 361 Epistemology
Spring. 4 credits.

PHIL 362 Philosophy of Mind

PHIL 381 Philosophy of Science: Knowledge and Objectivity (also S&TS 381)
Fall. 4 credits. R. Boyd.

PHIL 382 Philosophy and Psychology

PHIL 383 Choice, Chance, and Reason

PHIL 389 Philosophy of Science: Evidence and Explanation

PHIL 431 Mathematical Logic (also MATH 481)

PHIL 432 Topics in Logic (also MATH 482)
Spring. 4 credits. H. Hodes.

PHIL 433 Philosophy of Logic
Spring. 4 credits. H. Hodes.

PHIL 434 Foundations of Mathematics

PHIL 436 Intensional Logic (also MATH 483)

PHIL 437 Problems in the Philosophy of Language

PHIL 461 Metaphysics

Psychology

PSYCH 102 Introduction to Cognitive Science (also COGST 101, COM S 101, LING 170, and PHIL 191)
Fall. 3 or 4 credits. M. Spivey.

[PSYCH 111] Brain, Mind, and Behavior (also BIONB 111 and COGST 111)

PSYCH 201 Cognitive Science in Context Laboratory (also COGST 201 and COM S 201)
Spring. 4 credits. D. Field and staff.

PSYCH 205 Perception (also PSYCH 605)
Spring. 3 credits. J. Cutting.

PSYCH 209 Developmental Psychology (also PSYCH 709)
Spring. 4 credits. M. Goldstein.

PSYCH 214 Cognitive Psychology (also COGST 214)
Fall. 3 credits. S. Edelman.

PSYCH 215 Psychology of Language (also COGST 215, LING 215/715, and PSYCH 715)
Spring. 3 credits. M. Christiansen.

[PSYCH 223] Introduction to Biopsychology

PSYCH 305 Visual Perception (also VISST 305)
Fall. 4 credits. J. Cutting.

[PSYCH 311] Introduction to Human Memory (also PSYCH 611)

PSYCH 316 Auditory Perception (also PSYCH 716)
Fall. 3 or 4 credits. C. Krumhansl.

[PSYCH 326] Evolution of Human Behavior (also PSYCH 626)

PSYCH 330 Introduction to Computational Neuroscience (also BIONB 330 and COGST 330)
Fall. 3–4 credits. C. Linster.

PSYCH 332 Biopsychology of Learning and Memory (also BIONB 328 and PSYCH 632)
Spring. 3 credits. T. DeVoorogd.

PSYCH 342 Human Perception: Applications to Computer Graphics, Art, and Visual Display (also COGST 342, PSYCH 642, and VISST 342)
Fall. 3 or 4 credits. D. Field.

PSYCH 361 Biopsychology of Normal and Abnormal Behavior (also NS 361)
Fall. 3 credits. B. J. Strupp.

[PSYCH 396] Introduction to Sensory Systems (also BIONB 396 and PSYCH 696)

[PSYCH 412] Laboratory in Cognition and Perception (also PSYCH 612)

[PSYCH 413] Information Processing: Conscious and Nonconscious

PSYCH 414 Comparative Cognition (also COGST 414 and PSYCH 714)
Spring. 3 or 4 credits. M. Owen.

[PSYCH 415] Concepts, Categories, and Word Meanings (also PSYCH 615)

PSYCH 416 Modeling Perception and Cognition (also COGST 416 and PSYCH 616)
Spring. 4 credits. M. Spivey.

[PSYCH 417] The Origins of Thought and Knowledge (also PSYCH 717)
This course introduces graduate students generally for graduate students only. COGST 501 Issues in Biological Information Processing (also LING 501) Fall. 2 credits. Simultaneous enrollment in COGST/PSYCH 214, Cognitive Psychology, or permission of instructor. S. Edelman. This course introduces graduate students interested in cognition (especially those who plan to pursue the Cognitive Studies minor) to the central issues in computational cognitive psychology. It consists of a series of advanced-level discussions of selected examples from the material covered in COGST 101 (also COM S 101, LING 170, PHIL 191, and PSYCH 102) and COGST 214 (also PSYCH 214/614). The material from those courses includes perception, attention and consciousness, memory, thinking, and language. The course focuses on the development of skills required for critical evaluation of research in cognitive sciences, backed by an in-depth understanding of the relevant concepts and theories.

COGST 530 Representation of Structure in Visual Language (also LING 530 and PSYCH 530) Spring. 4 credits. Graduate seminar. Enrollment limited to 20 graduate students (or undergraduates with permission of instructor). Prerequisite: a course in each in cognitive psychology, linguistics, and computer science, or permission of instructor. Offered alternate years. Not offered 2004–2005. S. Edelman. The seminar focuses 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 531 Topics in Cognitive Studies: Mind and Reality in Science Fiction (also LING 531, BIONB 531, and PSYCH 531) Spring. 4 credits. Prerequisite: COGST 501, PSYCH 614, or permission of instructor. S. Edelman. What does it mean to be a mind? How is a mind affected by its embodiment? by the body's immersion in the world? by not having a body in the first place, or not any longer? Is the world out there what it seems? Is there a world out there? Profound thinking about, and sometimes disturbing insights into, the nature of the human mind and its relationship to reality are found in the writings of a handful of visionaries to be discussed in this course. Readings are selected from the works of Jorge Luis Borges, Philip K. Dick, Greg Egan, Ursula LeGuin, Stanislaw Lem, Richard Powers, Arkady and Boris Strugatzky, Vernor Vinge, Collier and others. For more information, see http://kybele.psych.cornell.edu/~edelman/cog-531-Spring-2005.

COGST 550 Special Topics in Cognitive Science (also PSYCH 550) Fall or spring. 4 credits. Topics and schedule available in the Psychology Department main office just prior to the start of classes each semester. M. Spivey.

COGST 614 Cognitive Psychology (also PSYCH 614) Fall. 5 credits. Includes (M W F) lectures of COGST/PSYCH 214 and a sec. S. Edelman. This course introduces students interested in cognition (especially those who plan to pursue the Cognitive Studies minor) to the central issues in computational cognitive psychology. It consists of a series of advanced-level discussions of selected examples from the material covered in COGST 101 (also COM S 101, LING 170, PHIL 191, and PSYCH 102) and COGST 214 (also PSYCH 214/614). The material from those courses includes perception, attention and consciousness, memory, thinking, and language. The course focuses on the development of skills required for critical evaluation of research in cognitive sciences, backed by an in-depth understanding of the relevant concepts and theories.

COGST 633 Language Acquisition Seminar (also PSYCH 633 and LING 633) Fall. 1–4 credits. Prerequisite: COGST/HD/LING/PSYCH 436 or equivalent, or permission of instructor. B. Lust. This seminar reviews and critiques current theoretical and experimental studies of first-language acquisition, with a concentration on insights gained by cross-linguistic study of this area. Attention is also given to the development of research proposals.

COGST 663 Philosophy of Psychology (also PHIL 663) Fall. 4 credits. T. Gendler. A research seminar directed at graduate students in philosophy and cognitive science. The focus is on identifying and discussing issues of philosophical significance raised by recent work in cognitive, developmental and social psychology. Primary readings are journal articles in psychology and philosophy. Likely topics include recent work on autism and theory of mind, recent work on the automaticity of social behavior, and recent work on motor planning and the common coding of perception and action.

COGST 671 Introduction to Automated Reasoning (also COM S 671) Fall. 4 credits. Prerequisite: (COM S 611 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 676-677 Decision Theory (also COGST 476/477, COM S 576/577, ECON 476/477, PSYCH 676/677) Fall and spring. 4 credits each semester. This is a two-semester course. In the fall semester the course is lecture based. Students are required to complete several problem sets and a final exam. In the spring semester there are additional lectures as well as visiting speakers. Students are required to read the speakers papers and participate in discussions. In the spring semester students are required to 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 has several objectives. First, we cover 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. Second, we cover the limitations of and problems with this theory. Issues to be discussed here include decision theory paradoxes revealed by experiments, cognitive and knowledge limitations, and computational issues. Third, we cover new research designed in response to these difficulties. Issues to be covered here include approaches to the foundations of decision theory, adaptive behavior, and shaping the individual decisions by aggregate/evolutionary forces.

COGST 691 Research Methods in Psychology (also COGST 491 and PSYCH 491/691) Spring. 4 credits. Enrollment limited to 15 students. D. Dunning. An 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. 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.

**COM S 664** Machine Vision  
Fall. 4 credits.

**COM S 671** Introduction to Automated Reasoning (also COGST 671)  
Fall. 4 credits.

**COM S 672** Advanced Artificial Intelligence  
Spring. 4 credits. Prerequisite: COM S 472.

**COM S 674** Natural Language Processing  
Spring. 4 credits. Prerequisite: COM S 472. Not offered every year.

**COM S 676** Reasoning about Knowledge  
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic. Not offered 2004–2005.

**COM S 677** Reasoning about Uncertainty  
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic. Not offered 2004–2005.

**COM S 772** Seminar in Artificial Intelligence  
Fall and spring. 2 credits.

**COM S 775** Seminar in Natural Language Understanding  
Fall and spring. 2 credits.

**EDUC 611** Educational Psychology  
Fall. 3 credits. Undergraduates admitted with permission from instructor. R. Ripple.

**EDUC 614** Gender, Context, and Epistemological Development (also FGSS 624)  
Fall. 3 credits. D. Schrader.

**EDUC 714** Moral Development and Education  
Spring. 3 credits. Offered alternate years. D. Schrader.

**HD 633** Language Acquisition Seminar (also COGST 633 and LING 633)  
Fall. 1–4 credits. Prerequisite: COGST/HD/LING/PSTCH 436 or equivalent. B. Lust.

**HD 600/700** Graduate Seminars

**LING 501** Issues in Biological Information Processing (also COGST 501)  
Fall. 2 credits. Simultaneous enrollment in COGST/PSCYH 214, Cognitive Psychology, or permission of instructor. S. Edelman.

**LING 520** Representation of Structure in Vision and Language (also COGST 530 and PSYCH 530)  

**LING 531** Topics in Cognitive Studies: Mind and Reality in Science Fiction (also COGST 531, BIONB 531, and PSYCH 531)  
Spring. 4 credits. S. Edelman.

**LING 609** Second Language Acquisition and the Asian Languages (also ASIAN 610)  

**LING 628** Connectionist Psycholinguistics (also COGST 428, LING 428, and PSYCH 428/628)  
Fall. 3 credits. Offered alternate years. M. Christiansen.

**LING 633** Language Acquisition Seminar (also COGST 633 and HD 633)  
Fall. 1–4 credits. Prerequisite: COGST/HD/LING/PSTCH 436 or equivalent. B. Lust.

**LING 700** Graduate Seminars

**MATH 681** Logic  
Spring. 4 credits.

**MATH 781–782** Seminar in Logic  
Fall and spring. 4 credits each.

**[MATH 780** Topics in Applied Logic  
Fall. 4 credits. Not offered 2004–2005.]

**PHI 633** Philosophy of Language—Linguistic Convention  
Spring. 4 credits. Z. Szabo.

**PHI 662** Philosophy of Mind  

**PHI 663** Philosophy of Psychology (also COGST 663)  
Fall. 4 credits. T. Gendler.

**PHI 700** Graduate Seminars

**PSYCH 519** Affects and Cognition (also NRE 507)  
Fall. 4 credits. A. M. Isen.

**PSYCH 521** Psychobiology (Developmental Seminar)  
Fall and spring. 4 credits each.

**PSYCH 530** Representation of Structure in Vision and Language (also COGST 530 and LING 530)  

**PSYCH 531** Topics in Cognitive Studies: Mind and Reality in Science Fiction (also COGST 531, LING 531, and BIONB 531)  
Spring. 4 credits. S. Edelman.

**PSYCH 550** Special Topics in Cognitive Science (also COGST 550)  
Spring. 4 credits. M. Spivey.

**PSYCH 614** Cognitive Psychology (also COGST 614)  
Fall. 5 credits. S. Edelman.

**PSYCH 616** Modeling Perception and Cognition (also COGST 416 and PSYCH 416)  
Spring. 4 credits. M. Spivey.

**PSYCH 618** Psychology of Music (also PSYCH 418)  
Spring. 4 credits. C. Krumhansl.

**PSYCH 628** Connectionist Psycholinguistics (also COGST 428, LING 428/628, and PSYCH 428)  
Fall. 3 credits. Offered alternate years. M. Christiansen.

**PSYCH 631** Effects of Aging on Sensory and Perceptual Systems (also BIONB 421 and PSYCH 431)  
Fall. 3 or 4 credits. B. Halpern.

**PSYCH 665** Topics in High-Level Vision (also COM S 392, COGST 465, and PSYCH 465)  
Spring. 4 credits. Offered alternate years. S. Edelman.

**PSYCH 691** Research Methods in Psychology (also COGST 491/691 and PSYCH 491)  
Spring. 4 credits. D. Dunning.

**PSYCH 714** Comparative Cognition (also COGST 414 and PSYCH 414)  
Spring. 3 or 4 credits. M. Owen.

**PSYCH 716** Auditory Perception (also PSYCH 316)  
Fall. 4 credits. C. Krumhansl.

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**COLLEGE SCHOLAR PROGRAM**

K. Gabard, director, 55 Goldwin Hall, 255–5792

The College Scholar Program is described in the introductory section of Arts and Sciences.

**COLLS 397** Independent Study  
Fall or spring. 1–4 credits. Prerequisite: permission of program director. Each participant must submit a brief proposal approved by the honors committee.

**COLLS 499** Honors Research  
Fall or spring. 1–8 credits; a maximum of 8 credits may be earned for honors research. Prerequisite: permission of program director. Each participant must submit a brief proposal approved by the honors committee.

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**COMPARATIVE LITERATURE**


The Department of Comparative Literature provides a broad range of courses in European as well as non-European literature. 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.

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**The Major**

The major enables students to develop an integrated knowledge of Western literature, to strengthen their reading and writing abilities,
and to prepare for careers demanding analytical, interpretive, and evaluative skills. Prospective majors should consult with the director of undergraduate studies. After declaring a major, a student chooses an adviser from the department's faculty. The requirements for the major are designed to allow each student to follow a course of study that combines intellectual rigor with the pursuit of personal interests. The specific contours of such a program are worked out in consultation with the student's adviser.

**Requirements for the Major**

1. Five courses in Comparative Literature at the 200 level and above, including the core course listed below. A student may include up to two literature courses from other departments.

2. One core course in Comparative Literature (for 2004–2005 COM L 458 [fall], COM L 415 [spring]) to be taken by all majors in their junior or senior year. At the discretion of the department, students may enroll in core courses in both their junior and senior years.

3. Five courses in literature and other areas of the humanities at the 200 level or higher, to be taken in one or more foreign language and literature departments. Texts must be read in the original language. A student may offer one literature course (conversation, composition, etc.) toward fulfilling this requirement.

4. An honors essay (COM L 493) of roughly 40 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. In lieu of a Senior Honors Essay, students may take one course at the 400–600 level. The department also encourages:

   1. a program that includes broad historical coverage (e.g., COM L 201–202: Great Books), intensive study of a single genre (e.g., COM L 363–364: The European Novel, COM L 365: Contemporary Fiction); analysis of problems in literary theory (e.g., COM L 302: Literature and Theory). The department also offers a number of strongly recommended 200-level courses designed to acquaint undergraduates with the discipline: COM L 203: Introduction to Comparative Literature, as well as broad-ranging introductory courses such as Global Fictions (COM L 204).

**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 student's achievement. At least B+ on the senior essay, in course work for the major, and in their overall academic performance at Cornell.

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**First-Year Writing Seminars**

Most 100-level courses may be used toward satisfying the freshman writing seminar requirements. See "John S. Knight Institute for Writing in the Disciplines" for a full description of the first-year seminar program.

**Courses**

**COM L 200 Introduction to Visual Studies** *(also VISSST 200, ENGL 292)*

*Spring.* 4 credits. T. Murray.

Introduction to modes of vision and the historical impact of visual images, visual structures, and visual space on culture, communication, and politics. Drawing on the visual traditions of both Western and non-Western societies, we examine procedures of sight (from optical machines to the psychology of vision and the philosophy of aesthetics), spaces (from landscapes to maps to cities); objects (from sacred sites to illuminated books to digital art); performances (race, sexuality, corporations); and technologies (photography, cinema, video, and computing). Through online writing and papers, students reflect on how visual studies complicates traditional models of defining and analyzing a world culture. By evaluating and interpreting seminal texts that represent and have shaped Western culture and hence form an essential part of the student's intellectual equipment. By evaluating and interpreting seminal texts from the Bible: Homer, Virgil, Lady Muraski, Dante, Castiglione, and Shakespeare, students will gain practice in critical reading, thinking, and writing.

**COM L 201 Great Books # (IV) (LA)**

*Fall.* 4 credits. S. Donatelli.

A reading of seminal texts that represent and have shaped Western culture and hence form an essential part of the student's intellectual equipment. By evaluating and interpreting selections from the Bible: Homer, Virgil, Lady Muraski, Dante, Castiglione, and Shakespeare, students will gain practice in critical reading, thinking, and writing.

**COM L 202 Great Books (IV) (LA)**

*Spring.* 4 credits. A. Bonjerse.

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 road tales such as songs, sonnets, and haiku to forms closely associated with our own times: e.g., free verse, "the prose poem." Texts are drawn from poetry by such authors as Basho, Akhmatova, Sowol, Nenuda, Sappho, Li Hui, Rumi, Shakespeare, Sor Juana, Baudelaire, Goethe, Keats, Dickinson, Baudelaire, Rilke, Akhmatova, Sowol, Nenuda, Sexton, Rich, and others. Poems not in English are read in translation, with texts in the original languages available for comparison. No previous study of poetry required.

**COM L 211 Comedy and Humanism (also THETR 214) (IV) (LA)**

*Spring.* 4 credits. S. Donatelli.

A reading of premodern and modern texts, mostly narrative, affords an appreciation of comedy in an increasingly rationalistic and technological age. Comic wisdom and its processes are considered as a valuable aspect of the humanist inheritance through our reading of key works by Plato, Erasmus, Cervantes, Austen, and Queneau. The philosophical dimensions of comic thought and action are explored through writings by DesCartes, Voltaire, and several modern commentators including Freud. The course invites a speculative reflection on times and related topics such as laughter, the carnival, and the fool.

**COM L 215 Sophomore Seminar: Comparative American Literatures (also AM ST 215) (IV) (LA)**

*Spring.* 4 credits. Limited to 15 students.

B. Maxwell.

Covers twentieth-century writing from Canada, the United States, the Caribbean, and Latin America. A hemispheric American Studies perspective will be emphasized. The course offers an opportunity for students to explore texts related to the experiences of the Americas, from conventional "strict" genres such as songs, sonnets, and haiku to forms closely associated with our own times: e.g., free verse, "the prose poem." Texts are drawn from poetry by such authors as Basho, Akhmatova, Sowol, Nenuda, Sappho, Li Hui, Rumi, Shakespeare, Sor Juana, Baudelaire, Goethe, Keats, Dickinson, Baudelaire, Rilke, Akhmatova, Sowol, Nenuda, Sexton, Rich, and others. Poems not in English are read in translation, with texts in the original languages available for comparison. No previous study of poetry required.
Program Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the disciplines outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

**COM L 227 Sophomore Seminar: Multilingualism**

Fall. 4 credits. N. Melas.

“The limits of my language,” wrote Wittgenstein, “means the limits of my world.” This course will explore the poetics and politics of the multiple worlds of those who speak, write, or live in more than one language. We will explore the circumstances by which a single language comes to dominate large areas of the world and the strategies writers practice to maintain an edge of difference. Examining a range of writing, from literature written in second or third languages, to texts written in intertexts between dominant and subjugated languages, to immigrant texts written between languages or in variants of “global English,” we will attend to the poetic strictures and possibilities of literary multilingualism, even as we survey the fate of other languages in our globalizing world. Possible authors include Conrad, Kafka, Ouolouguem, Roy, Glissant, Danticat, Shammas, Alvarez, Derrida, Lee. Familiarity with two languages recommended.

This is a special seminar sponsored by the John S. Knight Institutes Sophomore Seminars Program. Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the disciplines outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

**COM L 328 Literature of the Old Testament (also RELST 328) # (IV) (LA)**

Fall. 4 credits. C. M. Carmichael.

Analysis of small sections of well-known material for in-depth discussion.

**COM L 334 Islamic Spain: Culture and Society (also NES 339, JWST 339, RELST 334, and SPANL 339) # (IV) (CA)**

Spring. 4 credits. R. Blann.

For description, see NES 339.

**COM L 341 Imagining America (also AM ST 326, GOVT 303)**

Fall. 4 credits. D. Rubinstein.

For description, see AM ST 326.

**COM L 343 Contemporary Mass Culture in Japan and in the U.S. (also ASIAN 363) (IV)**

Spring. 4 credits. Enrollment limited to 25.

For description, see ASIAN 363.

**COM L 344 Tragic Theatre (also CLASS 345) # (IV) (LA)**

Fall. 4 credits. F. Ahl.

For description, see CLASS 345.

**COM L 346 The Art of Subversive Writing (also CLASS 346) # (IV) (LA)**


F. Ahl.

Writers are often unable to treat the most deeply controversial issues within their societies persuasively and safely by direct and open challenge, especially in ages and cultures that enforce conformity to some political, religious, or sexual norm. This course examines the literary and rhetorical techniques, formulated in the Greco-Roman antiquity and employed by writers and musicians for over two millennia, to express obliquely what may not be expressed overtly, with special attention to Imperial Rome (Plutarch, Quintilian, Demetrius), Victorian England (W. S. Gilbert), the post–World War II Americas and Europe (Frank Baum, Dalton Trumbo, Friedrich Dürrenmatt, Cesaw Milosz, Theodorakis, Abram Tertz, Jorge Luis Borges, and Vincicius de Moraes), and in selected movies (including Spartacus and Z.)
COM L 348 Shakespeare and Europe (also ENGL 349) (IV) (LA)
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 nineteen-
thirtieth- and twentieth-century Europe. This course will examine their debts to and influences upon continental drama. Readings will focus upon Shakespeare's plays in relation to Italian comedy, early French tragedy, and plays by Anton Chekhov, Bertolt Brecht, and Yasmina Reza.

COM L 350 Education and the Popular in the Fantasies (also RUSSL 350) # (IV) (LA)
Fall. 4 credits. P. Carden.
For description, see RUSSL 350.

COM L 355 Decadence (also ENGL 355) (IV) (LA)
Fall. 4 credits. E. Hanson.
For description, see ENGL 355.

COM L 356 Renaissance Literature (IV) (LA)
Spring. 4 credits. W. J. Kennedy.
An introduction to Renaissance literary texts with some attention to cultural backgrounds and intellectual history. Readings from Machiavelli, Erasmus, Rabelais, Shakespeare, Cervantes, and others.

COM L 362 The Culture of the Renaissance II (also ENGL 325, HIST 364, MUSIC 390, ART H 351, FRLIT 362 and RELST 362) # (III or IV) (CA)
Fall. 4 credits. (Friday required sections.) Next offered 2005-2006. W. J. Kennedy and K. P. Long.
Members of various departments lecture on Luther, Michelangelo, Edmund Spenser, Cervantes, Copernicus, Galileo, and Monteverdi. Guest lectures include Peter Dear, History; Esther Dotson, History of Art; and Rebecca Harris-Warrick, Music. Lectures and discussions introduce different methods of interpretation and of historical analysis.

COM L 363 The European Novel (IV) (LA)
Fall. 4 credits. Not offered 2004-2005. Staff.
The novel in its origins to the early nineteenth century. The course is discussion-based and focuses on detailed consideration of character and narrative technique in conjunction with analysis of the historical, philosophical, and aesthetic significance of the genre. Texts to include Lazafrillo de Tormes, Cervantes' Don Quixote, Defoe's Robinson Crusoe, Goethe's The Sorrows of Young Werther, Austen's Pride and Prejudice, and Sendrhal's The Red and the Black. All texts in English translation, but may of course be read in the original by students with command of the pertinent language. May be taken independently of COM L 364.

COM L 364 The European Novel (IV) (LA)
Spring. 4 credits. A. Banerjee.
An exposition of the European novel from the 1850s to the 1950s. Discussions focus on its place in a rapidly modernizing world and its engagement with changing institutions, intellectual trends, cultural preoccupations, and narrative forms. Readings from Flaubert, Dickens, Tolstoy, Dostoevsky, Zola, Woolf, Zamiatin, Kafka, Orwell, and Nabokov.

COM L 365 Contemporary Fiction (IV) (LA)
A study of European fiction and drama largely drawing on texts from the first half of the twentieth century. We pay particular attention 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 motif of ressentiment. Readings (in translation) chosen from the following: Robert Walser, Snowwhite and The Walk; Franz Kafka, The Trial, Thomas Mann, Death in Venice; Bertolt Brecht, The Rise and Fall of the City of Mahagonny; Joseph Roth, Hotel Savoy; Alfred Döblin, Berlin Alexanderplatz; Christa Wolf, The Quest for Christa T.; Louis Aragon, Paris Peasant; Louis-Ferdinand Céline, Death on the Installment Plan; Elio Vittorini, In Sicily; Natalia Grigzub, stories; and Isaac Babel, stories. Collateral theoretical readings by Georg Lukács, Ernst Bloch, Bertolt Brecht, Walter Benjamin, Siegfried Kracauer, Gershom Scholem, Elias Canetti, and Christa Wolf.

COM L 366 Visual Culture and Social Theory (also RUSSL 375, ART H 370, ARCH 338, VISST 368) (III or IV) (CA)
Fall. 4 credits. S. Buck-Morss.
For description, see GOVT 375.

COM L 375 Chekhov in the Context of Contemporary European Literature and Art (also RUSSL 373) # (IV) (LA)
Spring. 4 credits. A. Grusov.
For description, see RUSSL 375.

COM L 377 Open and Culture (also GERST 374, MUS 374, and THETR 374) # (IV) (LA)
For description, see CLASS 382.

COM L 386 Literature and Film of South Asia (also ASIAN 386)
Fall. 4 credits. A. Banerjee.
A survey of literary and filmic texts from the area comprising 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 English translations or subtitles.

Though focused on the twentieth century, the course engages epic and folkloric discourses in context. Authors studied range from canonical figures of Rabindranath Tagore, M. K. Gandhi, Ismat Chughtai, and Sadat Hasan Manto to contemporary literary pioneers such as Mahaasweta Devi, Kishwar Naheed, K. R. Ananthamurthy, and Taslima Nasreen. Films include auteur and documentary.

COM L 387 Twentieth-Century Black Cultural Movements (also COM L 690, ASRC 332/532) # (IV)

COM L 389 New Testament Narratives (also COM L 663, RUSSL 389) # (IV) (CA)
Spring. 4 credits. W. Kittler.
For description, see NES 314.

COM L 390 The Theory and Analysis of Narrative
Spring. 4 credits. Limited to 15 students.
Core course for majors. J. Culler.
Study of major theoretical approaches to narrative, with readings from Aristotle, Barthes, Bakhtin, Booth, Genette, Pratt, Shklovsky, and others. Attention is given to problems of plot structure: relations between plot and narrative discourse, the discrimination of narrators, questions of gender, and interpretive frameworks for narrative. Narratives by Balzac, Borges, Barth, and others (including stories selected by the students themselves) are studied for the light they can cast on problems of narrative structure.

COM L 416 Kafka In/On Translation (also GERST 416)
Spring. 4 credits. W. Kittler.
For description, see GERST 416.
What is it about poetry that has given rise in study of how biblical ethical and legal rules into his autobiography and his best­ recent years, in the wake of 1989 and 9/11, in of translating other contemporary discourses? This seminar will explore these and related tasks of translating poetry differ from those resists and invites translation? How do the all, across linguistic and cultural differences? Is poetry what gets lost in translation, as some ancient thinkers evaluate ethical and legal narrative enables us to observe in detail how of perennial interest. The relationships among space, place, and subjectivity through texts whose motivation of “poetry” in his writing on education and justice. The close connection between poetry and rhetoric. In present-day common usage, “poetry” include Benjamin, Bersani, de Man, Friedrich, Jakobson, Jauss, Johnson, and Sartre.

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This course is a wide-ranging investigation of the pitfalls and possibilities for cross-cultural comparison. We examine the structure and mechanisms of comparison, both as a disciplinary method and as a concept or practice: to what extent and in what circumstances can a comparison produce cultural difference, consolidate it, dissolve it, erect borders, inhabit borderlands, propose a global ecumene? With particular attention to colonialism and globalization, we inquire into the relation between various modes of comparison and broader contexts and ideologies. Though focused on the humanities and on theoretical texts, readings include incursions into the social sciences and humanities.

Emphasis on the centrality of Jewish writers and characters to modernist fiction, especially of the 1920s, in relation to European literary history, the nature of modernism, the rise of anti-Semitism, and, more generally, racial and imperial discourse. Readings from Babel, Joyce, Kafka, Proust, Stein, and Seveo, with possible attention to such writers as Borges, Celine, Debhn, Eliot, Hemingway, Mann, Nabokov, and Pound. Texts available in English.

Spring. 4 credits. C. Chase.

For description, see COM L 444.

COM L 645 Rousseau and Rhetorical Reading (also COM L 444 and ENGL 442)

Spring. 4 credits. C. Chase.

For description, see COM L 444.

COM L 650 Renaissance Poetry (also COM L 450, ENGL 622, ITALL 450/650)


W. J. Kennedy.

For description, see COM L 450.

COM L 652 Renaissance Humanism (also COM L 452)

Spring. 4 credits. Limited to 15 students.

W. J. Kennedy.

For description, see COM L 452.

COM L 653 From Electric to Electronic Media (also GERST 683, VISS 683)

Fall. 4 credits. W. Kittler.

For description, see GERST 683.

COM L 655 Aestheticism (also ENGL 655 and FGSS 655)

Fall. 4 credits. E. Hazen.

For description, see ENGL 655.

COM L 656 Aesthetic Theory: End of Art (also ART H 447 and GERST 656)

Fall. 4 credits. P. Gilchrist.

For description, see GERST 656.

COM L 658 Culture’s Threshold: Speculative Fictions from Rousseau to Froud (also GERST 625)

Spring. 4 credits. D. Reese.

For description, see GERST 625.

COM L 660 Visual Ideology (also ART H 660 and GERST 660)

Fall. 4 credits. G. Waitie.

For description, see GERST 660.

COM L 665 The Literature of Empire in the Renaissance (also ENGL 626)


W. Cohen.

Literary responses to the first age of European global expansion, viewed in the context of the category of the Renaissance and the ongoing process of the self-definition of European literature and Western civilization. Emphasis on the interplay between Mediterranean and oceanic imperialism, and on the relationship between ideology and literary form. Readings from lyric poetry, Ariosto, Bacon, Camoes, Campanella, Montaigne, More, Rabelais, Shakespeare, Spenser, Tasso, and especially Cervantes. Readings available in English.

COM L 667 Poetry and Rhetoric (also COM L 467, ENGL 483/683, FRLIT 437/637)


C. Chase.

For description, see COM L 467.

COM L 668 Theorizing Gender and Race in Asian Histories and Literatures with a Particular Focus on Japanese Cases (also COM L 398, ASIAN 388/688)


N. Sakai.

COM L 671 Transnational Imaginaries: Globalization and Culture

Fall. 4 credits. Limited to 15 students. Advanced undergraduates and graduates.


N. Melas.

The term “globalization” has become ubiquitous in recent years as the primary conceptual frame and material basis for understanding contemporary transnationalism. It evokes a brave new borderless world in which politics, culture, and social formations are no longer necessarily congruent with nor primarily beholden to national boundaries. It triumphantly or despairingly announces the end of history when space precedes time as the measure of human experience, and that experience exceeds the grasp of modernity’s autonomous subject. Globalization thus challenges many aspects of our experience of culture—both in its ethnographic and humanist guises—and of the categories through which we apprehend and analyze it.

COM L 673 Topics in Modern European Intellectual and Cultural History (also HIST 673 and JWST 674)

Fall. 4 credits. D. Darby.

For description, see HIST 673.

COM L 674 Contemporary Poetry and Poetics (also COM L 486, ENGL 488, SPANL 474/674)

Spring. 4 credits. J. Monroe.

For description, see COM L 486.

COM L 679 Femininity, Ethics, and Aesthetics (also COM L 479 and FRLIT 691) Fall. 4 credits. T. McNulty. For description, see FRLIT 491.


COM L 686 Althusser and Lacan (also FRIT 623, GERST 686, and GOVT 679) Fall. 4 credits. G. Waite. For description, see GERST 686.

COM L 687 New York, Paris, Baghdad: Poetry in the City (also COM L 390 and NSES 314/614) Spring. 4 credits. S. Toorawa. For description, see NSES 314.


COM L 692 Digital Bodies, Virtual Identities (also ART H 575, ENGL 696, and THETR 633) Fall. 4 credits. T. Murray. For description, see ENGL 696.

COM L 695 Historizing the Post-Modern (also JPLIT 614) Spring. 4 credits. B. deBarry. For description, see JPLIT 614.

**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 111–122 or 112–221 or 191–192–293–294)
- two semesters of introductory computer programming (COM S 100 and 211)
- a one-credit project (COM S 212)
- a seven-course computer science core (COM S 280, 312, 314, 321 or 322 or 421 or 428, 381, 414, and 482)
- two 400+ computer science electives, totaling at least six credits
- a computer science project course (COM S 413, 415, 419, 427, 433, 436, 473, 501, 514, or 664)
- a mathematical elective course (ENGRD 270, MATH 300+, T&AM 310, etc.)
- two 300+ courses that are technical in nature and total at least six credits
- a three-course specialization in a topic area other than computer science. These courses must be numbered 300 level or greater.

**Note:** All of the field electives described above must be courses of three or more credit hours with the exception of the COM S project course, which is two 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 COM S courses and MATH courses
- a GPA of 2.7 or better in MATH and Information Science (CIS)
- a one-credit project (COM S 212)
- a seven-course computer science core
- a three-course specialization in a topic area other than computer science. These courses must be numbered 300 level or greater

**Courses**

For complete course descriptions, see the computer science listing in the "Computing and Information Science (CIS)" section.

**COM S 099 Fundamental Programming Concepts**

Fall, summer. 2 credits. S-U grades only. No prerequisites. Freshman only.

**COM S 100 Introduction to Computer Programming (II) (MQR)**

Fall, spring, summer. 4 credits. During the fall semester, two versions of COM S 100 (COM S 100M and COM S 100J) are available as described in the computer science listing in the College of Engineering.

**COM S 101 Introduction to Cognitive Science (also COGST 101, LING 170, PHIL 191, and PSYCH 102) (II) (KCM)**

Fall, summer. 3 credits. For description, see COGST 101.

**COM S 113 Introduction to C**

Fall, spring. 1 credit. Usually weeks 1–4. Prerequisite: COM S 100 or equivalent programming experience. Credit is granted for both COM S 113 and 213 only if 113 is taken first. S-U grades only.

**COM S 114 Unix Tools**

Fall. 1 credit. Usually weeks 5–8. Prerequisite: COM S 100 or equivalent programming experience. S-U grades only.

**COM S 130 Introductory Design and Programming for the Web (also INFO 130)**

Fall, summer. 3 credits. No prerequisites.

**COM S 165 Computing in the Arts (also CIS 165 and MUSIC 165)**

Fall. 3 credits.

**COM S 172 Computation, Information, and Intelligence (also COGST 172, ENGR 172) (II) (MQR)**

Fall. 3 credits. Prerequisites: some knowledge of calculus. Not offered fall 2004.

**COM S 201 Cognitive Science in Context Laboratory (also COGST 201 and PSYCH 201) (III) (KCM)**

Fall or spring. 4 credits. Concurrent or prior registration in "Introduction to Cognitive Science" PSYCH 102/COGST 101/COM S 101/LING 170/PHIL 191 is suggested but not required. Knowledge of programming languages is not assumed. Limited to 24 students. Fall, B. Halpern and staff; spring, D. Field and staff. For description, see COGST 201.
COM S 211 Computers and Programming  
(also ENGRD 211) (II) (MQR)  
Fall, spring, summer. 3 credits.  
Prerequisite: COM S 100 or an equivalent  
course in Java or C++.

COM S 212 Java Practicum  
Fall, spring, summer. 1 credit.  
Letter grade only.  
Prerequisite: COM S/ENGRD 211.

COM S 213 C++ Programming  
Spring. 2 credits.  
Prerequisite: COM S 100 or  
equivalent programming experience.  
Students who plan to take COM S 113 and  
213 must take 113 first. S-U grades only.

COM S 214 Advanced UNIX Programming  
and Tools  
Spring, 1 credit. Usually weeks 5-8.  
Prerequisite: COM S 214 or equivalent.  
S-U grades only.

COM S 215 Introduction to C #  
Fall, spring. 1 credit. Usually weeks  
5-8. Prerequisite: COM S/ENG 211 or  
equivalent experience. S-U grades only.

COM S 230 Intermediate Design and  
Programming for the Web (also INFO 320)  
Spring. 3 credits. Prerequisite: COM S 130  
or equivalent knowledge.

COM S 280 Discrete Structures (II) (MQR)  
Fall, spring. 3 credits. Pre- or  
corequisite: COM S 211 or permission of  
instructor.

COM S 312 Data Structures and  
Functional Programming (II) (MQR)  
Fall, spring. 4 credits. Prerequisite: COM S  
211/212 or equivalent programming  
experience. Should not be taken  
concurrently with COM S 314.

COM S 314 Computer Organization (also  
ECE 314)  
Fall, spring. 4 credits. Prerequisite:  
COM S 211; COM S 312 or ENGRD 230  
recommended, but not required. Should  
not be taken concurrently with COM S 312.

COM S 321 Numerical Methods in  
Computational Molecular Biology  
(also BIQIBM 321 and ENGRD 321)  
(II) (MQR)  
Fall. 3 credits. Prerequisites: at least one  
course in calculus such as MATH 106,  
111, or 191 and a course in linear algebra  
such as MATH 221 or 294 or BIQIBM 417.  
COM S 100 or equivalent and some  
familiarity with iteration, arrays, and  
procedures. COM S majors and minors  
may use only one of the following toward  
their degree: COM S 321, 322, 421, or 428.  
Not offered fall 2004.

COM S 322 Introduction to Scientific  
Computation (also ENGRD 322)  
Spring, summer. 3 credits. Prerequisites:  
COM S 100 and (MATH 222 or 294).  
COM S majors and minors may use only  
one of the following toward their degree:  
COM S 321, 322, 421, or 428.

COM S 324 Computational Linguistics  
(also COGST 424, LING 424) (II)  
(MQR)  
Fall or spring. 4 credits. Prerequisites:  
LING 203; Labs involve work in the UNIX  
environment; COM S 114 recommended.  
For description, see LING 424.

COM S 330 Applied Database Systems  
(also INFO 330)  
Fall. 3 credits. Prerequisite: COM S 211/  
ENGRD 211. COM S majors may use only  
one of the following toward their degree:  
COM S/INFO 330 or COM S 433.

COM S 381 Introduction to Theory of  
Computing  
Fall, summer. 3 credits. Prerequisite:  
COM S 280 or permission of instructor.  
Credit will not be granted for both COM S  
381 and 481.

COM S 400 The Science of Programming  
Fall. 3 credits. Prerequisite: COM S 211.

COM S 411 Programming Languages and  
Logics  
Fall. 4 credits. Prerequisites: COM S 312 or  
permission of instructor.

COM S 412 Introduction to Compilers  
Spring. 3 credits. Prerequisites: COM S  
312 (or permission of instructor) and 314.  
Corequisite: COM S 413.

COM S 413 Practicum in Compilers  
Spring. 2 credits. Corequisite: COM S 412.  
A compiler implementation project related  
to COM S 412.

COM S 414 Systems Programming and  
Operating Systems  
Fall, spring, summer. 3 credits.  
Prerequisites: COM S 211, 212, 312 (or  
permission of instructor), and 314.  
Corequisite: COM S 415 in spring only.

COM S 415 Practicum in Operating  
Systems  
Fall, spring. 2 credits. Corequisite:  
COM S 414.

COM S 419 Computer Networks (formerly  
COM S 519)  
Spring. 4 credits. Prerequisites:  
COM S 211, COM S 312 or ENGRD 230  
recommended but not required, or  
permission of instructor. Not offered every  
year.

COM S 421 Numerical Analysis  
Fall, spring. 4 credits. Prerequisites:  
MATH 294 or equivalent, one additional  
mathematics course numbered 300 or above,  
and knowledge of programming. COM S  
majors and minors may use only one of  
the following toward their degree: COM S  
321, 322, 421, or 428.

COM S 426 Introduction to  
Computational Biology  
Fall. 3 credits. Prerequisites: COM S/  
ENGRD 211, COM S 280.

COM S 427 Practicum in Computational  
Biology  
Fall. 2 credits. Pre- or co-requisite:  
COM S 426.

COM S 428 Introduction to  
Computational Biophysics  
Fall. 3 credits. Prerequisites: COM S 100,  
CHEM 211 or equivalent, MATH 293 or  
294, PHYS 112 or 213, or permission  
of instructor. BIQIBM 330 recommended.  
COM S majors and minors may use only  
one of the following toward their degree:  
COM S 321, 322, 421, or 428.

COM S 430 Information Retrieval (also  
INFO 430)  
Fall. 3 credits. Prerequisite: COM S 211  
or equivalent.

COM S 431 Web Information Systems  
(also INFO 431)  
Spring. 3 credits. Prerequisites: COM S 211  
and some familiarity with the technology  
of web sites.

COM S 432 Introduction to Database  
Systems  
Fall. 3 credits. Prerequisites: COM S 312  
or 211, and permission of instructor.  
Recommended: COM S 213 and strong  
programming skills in C or C++.

COM S 433 Practicum in Database  
Systems  
Fall, spring. 2 credits. Corequisite: COM S 432.  
COM S majors may use only one of  
the following toward their degree: COM S/  
INFO 330 or COM S 433.

COM S 465 Computer Graphics I (also  
ARCH 374)  
Fall. 4 credits. Prerequisite: COM S/ENGRD  
211. May not be taken for credit after  
completion of COM S 417.

COM S 467 Computer Graphics II  
Spring. 3 credits. Prerequisite: COM S 465.

COM S 468 Computer Graphics  
Practicum  
Spring. 2 credits. Prerequisite: COM S 465.  
Corequisite: COM S 467.

COM S 472 Foundations of Artificial  
Intelligence  
Fall. 2 credits. Corequisite: COM S 472.

COM S 474 Introduction to Natural  
Language Processing (also COGST  
474, LING 474)  
Fall. 4 credits. Prerequisite: COM S 211.  
Not offered every year.

COM S 478 Machine Learning  
Spring. 4 credits. Prerequisites: COM S 280,  
312, and basic knowledge of linear algebra  
and probability theory.

COM S 480 Introduction to Cryptology  
(also MATH 335)  
Fall, spring. 3 credits. Prerequisite:  
COM S 100 and MATH 222 or 294.  
Students who take this course may not  
also receive credit for MATH 356.  
For description, see MATH 335.

COM S 481 Introduction to Theory of  
Computing  
Fall. 4 credits. Prerequisite: COM S 280  
or permission of instructor. Credit will not  
be granted for both COM S 381 and 481.  
A faster-moving and deeper version of COM S  
381. Corrective transfers between COM S 481  
and 381 (in either direction) are encouraged  
during the first few weeks of instruction.

COM S 482 Introduction to Analysis of  
Algorithms  
Spring, summer. 4 credits. Prerequisites:  
COM S 280, 312, and either 381 or 481,  
or permission of instructor.

COM S 483 Quantum Computation (also  
PHYS 481, 681)  
Spring. 2 credits. Prerequisite: familiarity  
with the theory of vector spaces over the  
complex numbers. Not offered every year.  
For description, see PHYS 481.
COM S 486 Applied Logic (also MATH 486) (II) (MQR)
Fall or spring. 4 credits. Prerequisites: MATH 222 or 294, COM S 280 or equivalent (such as MATH 352, 432, 434, 481), and some course in mathematics or theoretical computer science.

COM S 490 Independent Reading and Research
Fall, spring. 1–4 credits.

COM S 501 Software Engineering
Spring. 4 credits. Prerequisite: COM S 211 or equivalent experience programming in Java or C++.

COM S 504 Applied Systems Engineering (also CEE 504, ECE 512, M&AE 591, OR&E 512, SYSEN 510)
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 a strong system design component that is approved by a course instructor. For description, see SYSEN 510.

COM S 505 System Architecture, Behavior, and Optimization (also CEE 505, ECE 513, M&AE 592, OR&E 513, SYSEN 520)
Spring. 3 credits. Prerequisite: Applied Systems Engineering. For description, see SYSEN 520.

COM S 513 System Security
Fall. 4 credits. Prerequisites: COM S 414 or 419 and familiarity with JAVA or C programming languages.

COM S 514 Intermediate Computer Systems
Fall or spring. 4 credits. Prerequisites: COM S 414 or permission of instructor.

COM S 522 Computational Tools and Methods for Finance
Spring. 4 credits. Prerequisites: programming experience (e.g., FORTRAN or MATLAB) and some knowledge of numerical methods, especially numerical linear algebra. Not offered every year.

COM S 530 The Architecture of Large-Scale Information Systems (also INFO 5330)
Spring. 4 credits. Prerequisites: COM S/INFO 330 or COM S 432.

COM S 565 (also ART 372 and CIS 565; formerly CIS 518 and COM S 518)
Fall. 4 credits. Prerequisite: COM S/ENGRD 211.
For description, see ART 372.

COM S 572 Heuristic Methods for Optimization (also CEE 509, CIS 572, OR&E 533)
Spring. 3 or 4 credits. Prerequisite: COM S/ENGRD 211 or 322 or CEE/ENGRD 241, or graduate standing, or permission of instructor. Not offered every year. For description, see CEE 509.

COM S 578 Empirical Methods in Machine Learning and Data Mining
Fall. 4 credits. Prerequisites: COM S 280 and 312 or equivalent.

COM S 611 Advanced Programming Languages
Fall. 4 credits. Prerequisites: graduate standing or permission of instructor.

COM S 612 Compiler Design for High-Performance Architectures
Spring. 4 credits. Prerequisites: COM S 314 and 412 or permission of instructor.

COM S 614 Advanced Systems
Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor.

COM S 615 Peer-to-Peer Systems
Spring. 4 credits. Prerequisite: COM S 614 recommended.

COM S 619 Advanced Computer Networks
Fall. 4 credits. Prerequisites: COM S 419 or COM S 510, or permission of instructor. Not offered every year.

COM S 621 Matrix Computations
Fall. 4 credits. Prerequisites: MATH 411 and 431 or permission of instructor.

COM S 622 Numerical Optimization and Nonlinear Algebraic Equations
Spring. 4 credits. Prerequisite: COM S 621. Offered in odd-numbered years.

COM S 624 Numerical Solution of Differential Equations
Spring. 4 credits. Prerequisite: previous exposure to numerical analysis (e.g., COM S 421 or 621) to differential equations, and knowledge of MATLAB. Offered in even-numbered years.

COM S 626 Computational Molecular Biology
Spring. 4 credits. Prerequisites: familiarity with linear programming, numerical solutions of ordinary differential equations and nonlinear optimization methods.

COM S 627 Computational Biology: The Machine Learning Approach
Spring. 4 credits. Prerequisites: COM S 426 or 626 and COM S 478 or 578 or permission of instructor.

COM S 630 Representing and Accessing Digital Information (also INFO 630)
Fall. 4 credits. Prerequisite: COM S 472 or 478 or 578 or the equivalent.

COM S 632 Database Systems
Spring. 4 credits. Prerequisite: COM S 432 or 433 or permission of instructor.

COM S 633 Advanced Database Systems
Spring. 4 credits.

COM S 664 Machine Vision
Fall. 4 credits. Prerequisites: undergraduate-level understanding of algorithms and MATH 221 or equivalent.

COM S 665 Advanced Rendering
Fall or spring. 4 credits. Prerequisites: COM S 465 and 467 or equivalent and an undergraduate-level understanding of algorithms, probability and statistics, vector calculus, and programming.

COM S 667 Physically Based Rendering
Fall or spring. 4 credits. Prerequisites: COM S 465 and 467 or equivalent and an undergraduate-level understanding of algorithms, programming, and vector calculus.

COM S 671 Introduction to Automated Reasoning
Fall or spring. 4 credits. Prerequisite: COM S 611 and graduate standing or permission of instructor.

COM S 672 Advanced Artificial Intelligence
Spring. 4 credits. Prerequisites: COM S 472 or permission of instructor.

COM S 673 Integration of Artificial Intelligence and Operations Research (also CIS 673)
Spring. 3 credits.

COM S 674 Natural Language Processing
Spring. 3 credits. Prerequisites: COM S 472 or permission of instructor. COM S 474 is not a prerequisite. Not offered every year; semester TBA.

COM S 676 Reasoning about Knowledge
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic.

COM S 677 Reasoning about Uncertainty
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic. Offered in odd-numbered years.

COM S 678 Advanced Topics in Machine Learning
Spring. 4 credits. Prerequisites: COM S 478 or equivalent, or COM S 578 or equivalent, or permission of instructor.

COM S 681 Analysis of Algorithms
Fall. 4 credits. Prerequisite: COM S 482 or graduate standing.

COM S 682 Theory of Computing
Spring. 4 credits. Prerequisite: (COM S 381 or 481) and (COM S 482 or 681) or permission of instructor.

COM S 683 Advanced Design and Analysis of Algorithms
Spring. 4 credits. Prerequisites: COM S 681 or permission of instructor. Not offered every year.

COM S 684 Algorithmic Game Theory
Spring. 4 credits. Prerequisite: COM S 681 or permission of instructor. Not offered every year.

COM S 685 The Structure of Information Networks (also INFO 685)
Spring. 4 credits. Prerequisite: COM S 482.

COM S 686 Logics of Programs
Spring. 4 credits. Prerequisites: COM S 481, 682, and (MATH 481 or MATH/COM S 480). Not offered every year.

COM S 709 Computer Science Colloquium
Fall, spring. 1 credit. S-U grades only. For staff, visitors, and graduate students interested in computer science.

COM S 711 Seminar in Advanced Programming Languages
Fall or spring. 3 credits.

COM S 713 Seminar in Systems and Methodology
Fall. 4 credits. Prerequisites: a graduate course employing formal reasoning, such as COM S 611, 613, 671, and MATH 481 or MATH/COM S 480. Not offered every year; semester TBA.

COM S 715 Seminar in Programming Refinement Logics
Fall, spring. 4 credits. Prerequisite: permission of instructor.
COM S 717 Topics in Parallel Architectures
Fall. 4 credits. Prerequisite: COM S 612 or permission of instructor. Not offered every year; semester TBD.

COM S 718 Computer Graphics Seminar
Fall, spring. 4 credits.

COM S 719 Seminar in Programming Languages
Fall, spring. 4 credits. Prerequisite: COM S 611 or permission of instructor. S-U grades only.

COM S 721 Topics in Numerical Analysis
Fall, spring. 4 credits. Prerequisite: COM S 621 or 622 or permission of instructor.

COM S 726 Problems and Perspectives in Computational Molecular Biology (also PL BR 726)
Fall, spring. 1 credit. S-U grades only.

COM S 732 Seminar in Database Systems
Fall, spring. 4 credits. S-U grades only.

COM S 750 Evolutionary Computation and Design Automation (also M & A E 650)
Fall. 4 credits. Prerequisite: programming experience or permission of instructor.

COM S 751 Media Research and Critical Design (also CIS 751)
Fall. 4 credits. Prerequisite: graduate standing in COM S or equivalent ability to read technical research papers. Contact instructor if unsure of qualifications. Not offered every year.

COM S 752 Seminar on Scholarly Information Architecture
Fall. 3 credits. Prerequisite: concurrent enrollment in COM S 502 or equivalent experience. S-U grades only. Not offered every year.

COM S 754 Systems Research Seminar
Fall, spring. 1 credit. S-U grades only.

COM S 772 Seminar in Artificial Intelligence
Fall, spring. 4 credits. Prerequisite: permission of instructor. S-U grades only.

COM S 775 Seminar in Natural Language Understanding
Fall, spring. 2 credits.

COM S 786 Introduction to Kleene Algebra
Spring. 4 credits. Prerequisites: COM S 481 or 482, or MATH 481. COM S 682, elementary logic (MATH 481 or 681), algebra (MATH 432) recommended.

COM S 789 Seminar in Theory of Algorithms and Computing
Fall, spring. 4 credits. Prerequisite: permission of instructor. S-U grades only.

COM S 790 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. Letter grade only. Independent research or Master of Engineering project.

COM S 990 Special Investigations in Computer Science
Fall, spring. Prerequisite: permission of a computer science adviser. S-U grades only. Doctoral research.

CZECH
See Department of Russian.

DANCE
See Department of Theatre, Film, and Dance.

DUTCH
See Department of German Studies.

EARTH AND ATMOSPHERIC SCIENCES

The Department of Earth and Atmospheric Sciences covers the breadth of modern earth sciences. We live on a planet with finite resources and a finite capacity to recover quickly from human-induced environmental stresses. It is a naturally powerful planet, with geologic hazards such as earthquakes and volcanic eruptions that 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 energy sources and sustain the quality of our environment.

The department is the home of two majors in the College of Arts and Sciences: geological sciences and science of earth systems (SES). The geological sciences major emphasizes the solid earth and its history, while the science of earth systems major emphasizes study of the interactions among rock, water, air, and life in our planet’s operation. The geological sciences major is described below, and the SES major is described in the section “Special Programs and Interdisciplinary Studies.”

For the latest information about these academic programs, please consult our web page at www.eas.cornell.edu.

The Geological Sciences Major
The geological sciences major reveals Earth’s turbulent history from the formation of our solar system to the plate tectonic cycles and ice ages that dominate Earth’s present behavior. That history is highlighted by the co-evolution of life and the Earth system, a dramatic story that starts with the origin of life in our sun’s planetary system and leads to the modern interglacial phase of our planet’s latest ice age during which our species has emerged to play a major role in the planetary system. Topics of study also include the fundamental processes responsible for the concentration of mineral and energy resources that have enabled our technological evolution, and include natural hazards such as earthquakes, volcanic eruptions, floods, and landslides, which pose dangers to our increasingly vulnerable cities and infrastructure.

The geological sciences major prepares students in geology, geophysics, geochemistry, and geobiology for careers in energy and mineral industries, or in water and contaminant investigation (environmental geology), and academic and government research enterprises. Many of these career tracks involve graduate study, for which the major is excellent preparation. Alternatively, it is a valuable major for a pre-law or pre-med program or in preparation for a career in K-12 education.

In addition to classroom-based work, students learn by outdoor fieldwork and involvement in the rigorous research programs of the department. Field courses take students to New York and neighboring states, to South America, Europe, Asia, Canada, the U.S.A., and several oceanic islands. Facilities include equipment for processing seismic signals and satellite images of the Earth’s surface using extensive libraries of earthquake records, satellite images, and exploration seismic records, and instruments for highly precise chemical analysis of soil and water samples.

For admission to the geological sciences major, a student should have made substantial progress toward completing the following basic science requirements for the major: MATH 111-112 or MATH 191-192, PHYS 207-208 or PHYS 112-113, CHEM 207 or 211. Freshmen and sophomores should take an introductory EAS course (or courses), normally EAS 101, EAS 102, or EAS 154. Juniors with a strong foundation in mathematics and science may be accepted into the major without an introductory course. Majors take EAS 210, the five 300-level core courses listed below, six credits of additional course work from earth and atmospheric sciences courses numbered 300, 400, or 600, plus an additional course in either computer science or biological science or an intermediate-level course in biological science, mathematics, chemistry, or physics. In addition, a requirement for an advanced outdoor field experience may be met by completing one of the following four-credit options: a) EAS 417 (Field Mapping in Argentina, 3 credits) and EAS 491 or 492 (based on field observations) for a combined four-credit minimum; b) EAS 437 (Geophysical Field Methods, 3 credits) plus at least one credit of EAS 491 or 492 using geophysical techniques from EAS 437; c) EAS 491-492 (Undergraduate Research, 2 credits each) with a significant component of fieldwork; or d) a pre-approved outdoor advanced field course taught by another college or university (4-credit minimum).

Core Courses
EAS 326 Structural Geology
EAS 355 Mineralogy
EAS 356 Petrology and Geochemistry
EAS 375 Sedimentology and Stratigraphy
EAS 388 Geophysics and Geotectonics
Prospective majors should contact B. L. Isacks as early as possible for advice in planning a program. Students majoring in geological sciences may attend the departmental seminars and take advantage of cruises, field trips, and conferences offered through the Department of Earth and Atmospheric Sciences.

Courses offered at the 100 and 200 level are open to all students. Certain 300- and 400-level courses in earth and atmospheric sciences may be of particular interest to students of chemistry, biology, and physics. Students are encouraged to inquire about courses that interest them at the undergraduate program office in 2124 Snee Hall.

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 grade-point average, a cumulative average of 3.5 in the major, and complete an honors thesis (EAS 491 or 492). Students interested in applying should contact the director of undergraduate studies during the second semester of the junior year.

Courses
EAS 101 Introductory Geological Sciences (I) (PBS)
Fall. 3 credits. Staff.
Course topics include Earth systems and their evolution, Earth's historical astronomical context, physical geology and earth system science, water, mineral, and fuel resources, environmental concerns. Field trips in the Ithaca region.

EAS 102 Evolution of the Earth and Life (also BIO G 170) (I) (PBS)
Spring. 3 credits. J. L. Csincs.
Course topics include Earth systems and their evolution, Earth's historical astronomical context, plate tectonics, continental drift, and their implications for climate and life; co-evolution of life and the atmosphere; precedents for ongoing global change; and dinosaurs, mass extinctions, and human ancestry. Includes laboratories on reconstructing geological history and mapping ancient geography. Fossil collecting on field trips.

EAS 103 SES Freshman Colloquium
Fall. 1 credit. TBA.
Students meet weekly to discuss topics in earth science and develop skills that will help them meet their academic and career goals. Topics include an overview of the Science of Earth Systems (SES), the various areas of study open to students in this major, career paths, and active areas of research. Study, computer, and research skills useful for SES students are reviewed, along with opportunities for working in Earth system-related areas. The colloquium includes guest speakers and several field trips.

EAS 107 How the Earth Works
Fall. 1 credit. J. L. Csincs.
A user-friendly introduction to the workings and interactions of solid earth, ocean, atmosphere, and life as they relate to understanding ongoing global change.

EAS 108 Earth in the News (I) (PBS)
Summer. 3 credits. S. L. Losh.
This course provides an introduction to physical geology and earth system sciences 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.

EAS 109 Dinosaurs
Fall. 1 credit. J. L. Csincs.
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 111 To Know Earth (I) (PBS)
Fall. 3 credits. Staff.
Acquaints the nonscientist with Earth. Course topics include Earth structures and how Earth has evolved; Earth system science and building a habitable planet; effects of human activity on geologic environments, mitigating environmental damage, living with natural hazards; and mineral resource use in the twenty-first century and an environmentally sound fuel-minerals cycle.

EAS 121 Introduction to MATLAB (also CIS 121)
Fall, spring. 2 credits. Prerequisites: MATH 111, 191, or equivalent. D. Schwartz.
An 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 course is designed 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. The course assumes no programming experience.

EAS 122 Earthquake! (also ENGRD 207) (I) (PBS)
Spring. 3 credits. L. D. Brown.
The science of natural hazards and strategic resources is explored. 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 123 Basic Meteorology Lab
Fall. 1 credit. Concurrent enrollment in EAS 131 required. M. W. Wysocki.
Laboratory course covering topics presented in EAS 131. This course is required for atmospheric science majors, but is optional for other students taking EAS 131.

EAS 150 Fortran Applications in Earth Science
Spring. 2 credits. Prerequisite: CIS/EAS 121 or equivalent. Letter grade only. A. Pershing.
An introduction to the elements of computer programming using Fortran. Exercises involve mainly meteorological problems.

EAS 154 The Sea: An Introduction to Oceanography, Lecture (also offered as BioE 154) (I) (PBS)
Spring, summer. 3 credits. Prine: C. H. Greene, W. M. White; Summer: B. C. Monger.
A survey of the physics, chemistry, geology, and biology of the oceans for both science and nonscience majors. Topics include seafloor spreading and plate tectonics, marine sedimentation, chemistry of seawater, ocean currents and circulation, the oceans and climate change, ocean ecology, and coastal processes. The optional one-credit laboratory for this course is offered as EAS 155/BioE 155.

EAS 155 The Sea: An Introduction to Oceanography, Laboratory (also offered as BioE 155)
Spring. 1 credit. Prerequisite: concurrent enrollment in EAS 154. C. H. Greene, W. M. White.
Laboratory course covering topics presented in EAS 154.

EAS 200 Art, Archaeology, and Analysis (also ENGRD 185, MSE 285) (I) (PBS)

Spring. 3 credits. R. W. Kay.
An interdepartmental course on the use of techniques of science and engineering in cultural research. Applications of physical and physiological principles to the study of archaeological artifacts and works of art. Historical and technical aspects of artistic creation. Analyses by modern methods to deduce geographic origins and for exploration, dating, and authentication of cultural objects. Does not meet liberal studies distribution requirement for engineering.

EAS 201 Introduction to the Physics and Chemistry of the Earth (also ENGRD 201) (I) (PBS)
Fall. 3 credits. Prerequisites: PHYS 112 or 207. J. Phipps Morgan, L. Cathles.
Course topics include formation of the solar system; accretion and evolution of the earth; the rock cycle: radioactive isotopes and the geological time scale; plate tectonics, rock and minerals, earth dynamics, mantle plumes; the hydrologic cycle: runoff, floods and sedimentation, groundwater flow, and contaminant transport; and the weathering cycle: chemical cycles, CO2 (weathering), rock cycle, controls on global temperature (CO2 or ocean currents), oil, and mineral resources.

EAS 203 Fundamental Principles of Earth Science
Fall. 3 credits. Letter only. Prerequisites: modest science background advantageous. L. M. Cathles, J. Phipps Morgan.
Have you ever wondered how to use quantitative logic but have been afraid to risk taking a course where your grade depended upon it? Are you interested in the earth? If so, try EAS 203 this semester. Lectures develop quantitative insight into how the earth works and are the same as in EAS 201. A term paper substitutes for quantitative prelims, and the final is an essay exam. A weekly discussion session with the professors explains the physics and math conceptually. The goal is to develop an appreciation for what quantitative approaches can contribute to the intellectual understanding of any subject, while also learning about the earth, its evolution, and its future environmental challenges.

**EAS 210 Introduction to Field Methods in Geologic Science (I) (PBS)**
Fall. 3 credits. Lecture: Saturday field trips. Prerequisites: EAS 101 (or 201) or permission of instructor. R. W. Allmendinger.

Course covers the methods by which rocks are used as a geological database. Topics include field methods used in the construction of geological maps and cross-sections, systematic description of stratigraphic sections, theoretical aspects of fieldwork, and the use of computer software. There are two field trips and one additional lecture during most of these weeks. Course includes one weekend field trip to eastern New York.

**EAS 213 Marine and Coastal Geology (I) (PBS)**
Summer. 4 credits. Prerequisite: an introductory course in geology or ecology or permission of instructor. Staff.

A special two-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island near Portsmouth, New Hampshire. For more details and an application, consult the SML office. Estimated cost for 2005 (including tuition, room, board, and ferry transportation) is $2,120.

**EAS 222 Seminar—Hawaii's Environment**
Fall. 1 credit. S-U only. A. Moore, L. A. Derry.

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 240 Field Study of the Earth System**
Spring. 5 credits. Prerequisites: one semester of calculus (MATH 191/192/193 or MATH 111/112) and two semesters of any of the following: PHYS 207/208 or 112/213; CHEM 207/208; BIO 101/103–102/104 or 105/106 or 109/110; or equivalent course work. Limited to those enrolled in Cornell Abroad Earth and Environmental Sciences Semester in Hawaii. A. Moore and M. Wysocki.

This is an interdisciplinary field course covering fundamental concepts of the Earth system. Topics include global circulation patterns in the solid Earth, atmosphere, and ocean; energy and mass transfer; change and variability of Earth, atmosphere, and ocean systems; the temporal record of change covered 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 250 Meteorological Observations and Instruments**
Fall. 3 credits. Prerequisite: EAS 131. Lab fee $50. M. W. Wysocki.

Methods and principles of meteorological measurements and observations including surface, free-air, and remote systems. Topics include instrument sitting, mounting, and protection; instrument response characteristics, calibration, and standardization; and recorders and data logging systems. Includes laboratory exercises in observation and data analysis. Intended to serve as preparation for Observers Examination.

**EAS 268 Climate and Global Warming (I) (PBS)**
Spring. 3 credits. Prerequisite: basic college math. A. T. DeGaetano.

Students from a range of disciplines become familiarized with such contemporary issues in climatology as global warming and El Niño. Introductions to the natural greenhouse effect, past climates, observed and projected climate changes and impacts. Also natural climate variations and their consequences and predictability. Weekly student-led discussions of issues appearing in journals such as Nature.

**EAS 296 Forecast Competition**
Fall and spring. 1 credit. S-U grades only. Prerequisites: sophomore undergraduate standing in atmospheric science or permission of instructor. D. S. Wilks.

This two-semester course provides daily exercise in probabilistic weather forecasting, in which students compete to forecast local weather most skillfully. Enroll for two consecutive semesters, with credit awarded after the second semester. May be repeated for credit.

**EAS 302 Evolution of the Earth System (I) (PBS)**
Spring. 4 credits. Prerequisites: MATH 112 or 192 or CHEM 207 or equivalent. W. M. White, W. D. Allmon, and B. L. Isacks.

This course covers the co-evolution of life and the earth system: Earth's early history; plate tectonics, continental drift, and climate changes during the past billion years; mountain building, ice ages, and our own emergence during the past ten million years. Serves as an introduction to methods of interpreting information preserved in the rock record.

**EAS 315 Geomorphology (I) (PBS)**
Fall. 4 credits. Prerequisite: a 3-credit EAS course. B. L. Isacks.

A study of the processes that sculpt the Earth's terrestrial landscapes. Landforms constructed by Earth's internal processes are the point of departure as we examine their modification by physical interaction with the atmosphere. Laboratory exercises include both field examination of landforms of the Finger Lakes area and computer analysis of satellite images and digital elevation models of examples from around the globe. Includes two Saturday field trips.

**EAS 321 Introduction to Biogeochemistry (also NTRRES 321) (I) (PBS)**
Fall. 4 credits. Prerequisites: CHEM 207, MATH 112, plus a course in biology and/ or geology. L. A. Derry.

Control and function of the Earth's global biogeochemical cycles. The course 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 isotope tracers, and mathematical models. Interactions between global biogeochemical cycles and other components of the Earth system are discussed.

**EAS 322 Biogeochemistry of the Hawaiian Islands**
Spring. 4 credits. Prerequisites: BIOEE 201, EAS 213, EAS 455, or permission of instructor. Limited to those enrolled in Cornell Abroad Earth and Environmental Sciences Semester in Hawaii. L. Derry.

A field-oriented study of biogeochemical processes and ecosystems across the Hawaiian Islands. Field, class, and laboratory work will focus on how landscape age and climate strongly control biogeochemical cycling and ecosystem development in Hawaii. Other topics include succession of ecosystems, evolution of nutrient cycles, and impacts of invasive species. The class will be structured around field projects, carried out both as groups and individually.

**EAS 326 Structural Geology (I) (PBS)**
Spring. 4 credits. Prerequisite: one semester of calculus and one of physics. K. H. Cook, P. J. Giersch.

Processes that determine climate and contribute to its change are discussed, including atmospheric radiation, ocean circulation, and atmospheric dynamics. Contemporary climate change issues are investigated and discussed in the context of natural variability of the system.

**EAS 334 Microclimatology (I) (PBS)**

Consider the relationships 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 341 Atmospheric Thermodynamics and Hydrostatics (I) (PBS)**
Fall. 3 credits. Prerequisites: 1 year of calculus and 1 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 covered include thermodynamic processes of dry air, water vapor, and moist air and concepts of hydrostatics and stability.

EAS 342 Atmospheric Dynamics (also ASTRO 342) (I) (PBS)
Spring. 3 credits. Prerequisites: 1 year each of calculus and physics. K. H. Cook and P. J. Gierasch.

An 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 Holton's *An Introduction to Dynamic Meteorology.*

EAS 350 Dynamics of Marine Ecosystems (also BIOEE 350) (I) (PBS)
Fall. 3 credits. Prerequisites: 1 year of calculus and one semester of oceanography (i.e., EAS 154) or instructor's permission. Not offered 2004-2005.

This lecture course covers the interactions of physical and biological processes in marine ecosystems. It begins by looking at these processes on a global scale and works down to the scales relevant to individual organisms. Topics include: global patterns of ocean circulation; global patterns of ocean production; climate and the role of the ocean in global climate change; the El Nino/Southern Oscillation; ecosystem dynamics of the open ocean and coastal environments.

EAS 351 Marine Ecosystems Field Course
Spring. 3 credits. Prerequisites: one semester of calculus (MATH 191-192/193 or MATH 111-112), and two semesters of biology (BIO 101, 103-102/104 or 105/106 or 109/110); one semester of oceanography (EAS 104) is recommended. Limited to those enrolled in Cornell Abroad Earth and Environmental Sciences Semester in Hawaii. C. Greene and B. Monger.

This field course covers the interactions of physical and biological processes in marine ecosystems. It starts by looking at these processes on ocean basin to regional scales and works down to the 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 352 Synoptic Meteorology (I) (PBS)
Spring. 3 credits. Prerequisites: EAS 341 and concurrent enrollment in EAS 342.

M. W. Wysocki.

Weather mapping and forecasting techniques are studied by applying the principles of fluid and heat flow. This course strengthens previously introduced meteorological concepts which are applied to forecasting mesoscale synoptic scale weather systems, such as cyclones, anticyclones, jet streams, fronts, and waves.

EAS 355 Mineralogy (I) (PBS)
Fall. 4 credits. Prerequisites: EAS 101 or 201 and CHEM 207 or 211 or permission of instructor. S. Mahlburg Kay.

The course covers chemical and physical properties and identification of minerals with emphasis on the rock forming minerals that are the principal constituents of the Earth and other planets. Topics include internal and external crystallography, crystal chemistry, introductions to X-ray crystallography and optical mineralogy, and a systematic examination of the structures, chemistry, and occurrence of the rock-forming minerals. Independent project includes use of electron microprobe and X-ray facilities.

EAS 356 Petrology and Geochemistry (I) (PBS)
Spring. 4 credits. Prerequisite: EAS 355. R. W. Kay.

Principles of phase equilibrium as applied to igneous and metamorphic systems. Description, classification, chemistry, origin, regional distribution, and dating of igneous and metamorphic rocks. Geochemical distribution of trace elements and isotopes in igneous and metamorphic systems. The petrological evolution of the planets.

EAS 375 Sedimentology and Stratigraphy (I) (PBS)
Fall. 4 credits. Prerequisite: EAS 101 or 201. J. L. Cisne.

Course covers the formation of sedimentary rocks; depositional processes and environments; correlation of strata in relation to time and environment; petrology of sandstone and limestone; geological age determination; reconstruction of paleogeography and interpretation of earth history from stratigraphic evidence; and organization of strata in stratigraphic sequences.

EAS 388 Geophysics and Geotectonics (I) (PBS)
Spring. 4 credits. Prerequisites: MATH 192 (or 112) and PHYS 208 or 213. B. L. Bach.

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 401 Fundamentals of Energy and Mineral Resources
Spring. 3 credits. L. Cathles.

Fossil fuels will continue to be the prime source of energy for the foreseeable future, and society depends upon mineral resources. This course describes and quantitatively analyzes energy and mineral resources of the Earth. The distribution and nature of Earth resources are described, focusing on U.S. examples. Quantitative tools are then developed and used to understand the processes that accumulate resources to economic levels.

EAS 417 Field Mapping in Argentina (I) (PBS)
Summer. 3 credits. Prerequisites: EAS 210 and 326; Spanish desirable but not required. S. Mahlburg Kay.

Covers modern techniques of geological mapping applied in the region of San Juan, Argentina, including folded and faulted sedimentary rock units of the Andean Precordillera (San Juan River section); intensely deformed Precambrian metamorphic rocks of the Pampaean Ranges (Pie de Palo), and shallow-level silicic intrusives (Cerro Blanco-Ullin).

EAS 434 Reflection Seismology (I) (PBS)
Fall. 3 credits. Prerequisites: MATH 192 and PHYS 208, 213, or equivalent. 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 key to state-of-the-art seismic processing, modeling, and interpretation software from LandMark.

EAS 435 Statistical Methods in Meteorology and Climatology (II) (MQR)
Fall. 3 credits. Prerequisites: an introductory course in statistics (e.g., AEM 210) and calculus. D. Senning.

Covers statistical methods used in climatology, operational weather forecasting, and selected meteorological research applications: some statistical characteristics of meteorological data, including probability distributions and correlation structure; operational forecasts derived from multiple regression models, including the MOS system; forecast verification techniques and scoring rules; and time series analysis, EOFs, and other research topics as time permits.

EAS 437 Geophysical Field Methods (I) (PBS)
Fall. 3 credits. Prerequisite: PHYS 213 or 208, or permission of instructor. Offered alternate years. Not offered 2004-2005.

L. D. Brown.

Introduction to field methods of geophysical exploration, especially as applied to environmental issues. Emphasis is on seismic, ground-penetrating radar, gravity, and magnetic techniques. Field surveys carried out at the beginning of the semester are analyzed and interpreted.

EAS 445 Introduction to Groundwater Hydrology (also BEE 471 and CEE 431) (I/PBS)
Spring. 3 credits. Prerequisite: MATH 294 and ENGRD 202. L. Cathles.

Intermediate-level study of aquifer geology, groundwater flow, and related design factors. Includes description and properties of natural aquifers, groundwater hydraulic, soil water, and solute transport.

EAS 447 Physical Meteorology (I) (PBS)
Fall. 3 credits. Prerequisites: 1 year each of calculus and physics. Offered alternate years. Next offered 2005. A. T. DeGaetano.

Primarily a survey of natural phenomena of the atmosphere, with emphasis on their underlying physical principles. Topics include composition and structure of the atmosphere, atmospheric optics, acoustics and electricity, microphysical cloud processes, and principles of radar probing of the atmosphere.

EAS 451 Synoptic Meteorology (II) (PBS)
Fall. 3 credits. Prerequisites: EAS 341 and 342. J. F. Colucy.

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 are covered. Laboratory 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 453 Advanced Petrology (I) (PBS)]
Fall. 3 credits. Prerequisite: EAS 356. Offered alternate years. Next offered 2005-2006. W. W. Kay.
Course topics include: magmas and metamorphism in the context of plate tectonics; major and trace element chemistry and the creation and modification of igneous rocks; and temperature and stress in the crust and mantle and their influence on reaction rates and textures of metamorphic rocks. Application of experimental studies to natural systems.

[EAS 454 Advanced Mineralogy (I) (PBS)]
Spring. 3 credits. Prerequisite: EAS 355 or permission of instructor. Offered alternate years. Not offered 2004-2005. S. Mahlung Kay.
Course covers crystallography and crystal chemistry of minerals and the methods of their study. Includes X-ray diffraction, optical methods, computer simulation of crystal structures. Emphasis is on effects of high pressures and temperatures with implications for understanding the Earth’s interior.

[EAS 455 Geochemistry (I) (PBS)]
Fall. 4 credits. Prerequisites: CHEM 207 and MATH 192 or equivalent. Recommended: EAS 256. Offered alternate years. Next offered 2005-2006. W. M. White.
Looks at the Earth from a chemical perspective. Covers the formation of the elements; cosmochemistry; chemical evidence regarding the formation of the Earth and solar system; trace-element geochemistry; isotopes; geochronology; geothermal systems and kinetics; chemical evolution of the crust, mantle, and core; weathering and the chemistry of natural waters; chemistry of rivers and the oceans; hydrothermal systems and ore deposition.

[EAS 456 Mesoscale Meteorology (I) (PBS)]
Spring. 3 credits. Prerequisites: EAS 341 and 342 or permission of instructor. Offered alternate years. Next offered 2006. S. J. Colucci.
Covers the structure and dynamics of mid-latitude 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 457 Atmospheric Air Pollution (I) (PBS)]
Fall. 3 credits. Prerequisites: EAS 341 or one course in thermodynamics, and one semester of chemistry, or permission of instructor. Offered alternate years. M. W. Wysocki.
Course examines sources, effects, transport, measurement, and controls of air pollution. The basic principles in each area are discussed with an emphasis on their local, regional, and global impacts.

[EAS 458 Volcanology (I) (PBS)]
Fall. 3 credits. Prerequisite: EAS 356 or equivalent. Offered alternate years. R. W. Kay and W. M. White.
Considers the causes of volcanism, melting in the Earth, and the origin of magmas. Topics include physical volcanology, nature and types of volcanic eruptions and associated deposits, eruption mechanics; volcanic plumbing systems, magma chamber processes, evolution of magma; volcanism and impact phenomena in the solar system; volcanic hazard assessment and volcano monitoring, and ore deposits associated with volcanism.

[EAS 460 Late Quaternary Paleoclimatology]
Fall. 3 credits. M. Goman.
This course explores topics in Late Quaternary paleoclimatology. This course is broadly divided into three sections: 1) introductory topics; 2) research techniques; and 3) field and laboratory-based research.

[EAS 462 Marine Ecology (also BIOEE 462) (I) (PBS)]
Fall. 3 credits. Limited to 75 students. Prerequisite: EAS 261. Offered alternate years. C. D. Harvell, 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 and the development 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 including polar seas, temperate coastal waters, and tropical coral reefs.

[EAS 470 Weather Forecasting and Analysis]
Spring. 3 credits. Prerequisites: EAS 352 and EAS 451. M. W. Wysocki.
An applied course with an opportunity to focus on weather forecasting and analysis techniques for various regions around the world. Lectures emphasize the application of student's knowledge of atmospheric dynamics, thermodynamics, and computer-data analysis to forecast the development and movement of multiscale weather systems. Students participate in weekly forecast discussions, write daily forecasts that include a synoptic discussion, QPF, and severe-weather outlook for the forecast region, and lead class discussion on assigned readings.

[EAS 475 Special Topics in Oceanography]
Fall, spring, summer. 2-6 var. credits. Prerequisites: one semester of oceanography, and permission of instructor. Fall, spring: C. H. Greene; summer: B. C. Monger.
Undergraduate instruction and participation in advanced areas of oceanographic research. Topics change from term to term. Contact instructor for further information.

[EAS 476 Sedimentary Basins: Tectonics and Mechanisms (I) (PBS)]
Fall. 3 credits. Prerequisite: EAS 375 or permission of instructor. Offered alternate years. T. E. Jordan.
Covers subsidence of sedimentary basins from the point of view of plate tectonics and geomorphology. Topics include mechanisms of subsidence, sediment supply, and environmental characteristics in development of stratigraphic sequences; stratigraphic characteristics of active-margin, passive-margin, and cratonic basins; and geophysical and stratigraphic modeling; sequence stratigraphy. Modern and ancient examples are used.

[EAS 478 Advanced Stratigraphy (I) (PBS)]
Fall. 3 credits. Prerequisite: EAS 375 or permission of instructor. Offered alternate years. Next offered 2005-2006. T. E. Jordan.
Modern improvements on traditional methods of the study of ages and genetic relations among sedimentary rocks, emphasizing 3-D relationships. Techniques and applications of sequence stratigraphy at scales ranging from beds to entire basins. Physical correlation, dating techniques, and time resolution in sedimentary rocks. Physical controls on the stratigraphic record. Numerical modeling.

[EAS 479 Palaeobiology (also BIOEE 479) (I) (PBS)]
Fall. 4 credits. Prerequisites: 1 year of introductory biology and either BIOEE 274, 573, EAS 375, or permission of instructor. Offered alternate years. Not offered 2004-2005. Staff.
A survey of the major groups of organisms and their evolutionary histories. Intended to fill out the biological backgrounds of earth and atmospheric sciences students concerning the nature and significance of the fossil record for their respective studies.

[EAS 481 Senior Survey of Earth Systems (I) (PBS)]
Survey course that integrates undergraduate course work, intended to enhance overall understanding of geological sciences. Emphasis on current models of earth's dynamic systems (e.g., global climate change; mantle evolution). Includes guest lecturers, synthesis and review literature; scientific literature readings; discussions; student presentations.

[EAS 483 Environmental Biophysics (also CSS 483) (I) (PBS)]
Spring. 3 credits. Offered alternate years. S. J. Riba.
Introduction to basic principles of energy and mass transfer and storage in soil-plant systems. Topics include energy budgets, soil heat flow, water movement in saturated and unsaturated soils, evapotranspiration, water, gas, and nutrient dynamics in the soil-plant-atmosphere continuum. Applications to agronomic and environmental problems and instrument design and use are considered through discussion and problem sets.

[EAS 487 Introduction to Radar Remote Sensing (also ECE 487) (I) (PBS)]
Fall. 3 credits. Prerequisites: PHYS 208 or 213 or equivalent. D. L. Hysell.
Course on 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 will be 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 491-492 Undergraduate Research
Fall, spring. 1-4 credits. Staff (B. L. Isaac's, 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 494 Special Topics in Atmospheric Science
Fall, Spring. 8 credits maximum. S-U grades optional. Undergraduate level. 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.

EAS 496 Internship experience
Fall or spring. 1-2 credits. S-U grades only. Staff.

EAS 497 Individual Study in Atmospheric Science
Fall or spring. 1-6 credits. S-U grades optional. Students must register with an Independent Study form. Staff. Topics are arranged at the beginning of the term for individual study or for group discussions.

EAS 498 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/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 499 Undergraduate Research in Atmospheric Science
Fall or spring. Credit by arrangement. S-U grades only. Students must register with an Independent Study form. Staff. Independent research on current problems in atmospheric science.

EAS 500 Design Project in Geohydrology
Fall, spring. 3-12 credits. An alternative to an industrial project for M.Eng. students choosing the geohydrology option. May continue over 2 or more semesters. L. M. Cathles. The project may address one of the many aspects of groundwater flow and contamination and must involve a significant geological component and lead to concrete recommendations or conclusions of an engineering nature. Results are presented orally in a professional report.

EAS 502 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 622 Advanced Structural Geology I]
Spring. 3 credits. Prerequisites: EAS 326 and permission of instructor. Offered alternate years. R. W. Allmendinger. Stress-strain theory and application. Advanced techniques of structural analysis. Topics include finite and incremental strain measurement; microstructure, preferred orientation, and TEM analysis; pressure solution and cleavage development; and experimental deformation. Applications to deformation of unconsolidated sediments, brittle and brittle-ductile deformation of supracrustal strata, and ductile deformation of high-grade metamorphic rocks. Kinematic analysis of shear zones and folds in these regimes.

EAS 624 Advanced Structural Geology II
Spring. 3 credits. Prerequisites: EAS 326 and permission of instructor. Offered alternate years. R. W. Allmendinger. Geometry, kinematics, and mechanics of structural provinces. Concentration on thrust belts, rift provinces, and strike-slip provinces. Techniques of balanced cross sections.

[EAS 628 Geology of Orogenic Belts]
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 2004-2005. Staff. A seminar course in which students study specific geologic topics of an orogenic belt selected for study during the term. The course is intended to complement EAS 681.

[EAS 634 Advanced Geophysics]
Fall. 3 credits. Prerequisite: EAS 388 or permission of instructor. Offered alternate years. Not offered 2004-2005.

EAS 636 Advanced Geophysics II: Quantitative Geodynamics
Spring. 3 credits. Prerequisite: EAS 388 or permission of instructor. Offered alternate years. J. Phripps Morgan. This course quantitatively studies 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 mantle convection and melting, mountain building, and erosion processes.

EAS 641 Analysis of Biogeochemical Systems
Spring. 3 credits. Prerequisite: MATH 293 or permission of instructor. Offered alternate years. L. A. Derry. 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; applications to current research of participants or from recent literature.

EAS 651 Atmospheric Physics (also ASTRO 651)
Fall. 3 credits. Prerequisite: a good background in undergraduate calculus and physics is required. Offered alternate years. K. H. Cook, P. J. Gierasch, S. J. Colucci. A survey of the fundamental physical processes in atmospheres. Topics include thermodynamics of atmospheric gases, moist effects, hydrostatics, convective instability, atmospheric radiation and radiative heating, radiative-convective equilibrium, clouds, cloud microphysics, and precipitation processes. Thermal structure and greenhouse effects on the Earth and other planets are discussed. The course is taught at the level of Fundamentals of Atmospheric Physics by Salby.

EAS 652 Advanced Atmospheric Dynamics (also ASTRO 652)
Spring. 3 credits. Prerequisites: EAS 341 and 342 or their equivalent. Offered alternate years. S. J. Colucci, P. J. Gierasch. Course topics include quasi-geostrophic theory, atmospheric waves, hydrodynamic instability, the general circulation of the atmosphere, and topics selected from among numerical weather prediction and tropical, mesoscale, and middle atmosphere processes according to student interest.

EAS 656 Isotope Geochemistry
Spring. 3 credits. Open to undergraduates. Prerequisite: EAS 455 or permission of instructor. Offered alternate years. W. M. White. Course topics include nucleosynthetic processes and the isotopic abundances of the elements, geochronology and cosmochronology using radiocative decay schemes, including U-Ph, Rb-Sr, Sm-Nd, K-Ar, U-series isotopes, and cosmonogenic isotopes such as 14C and 36Cl, use of radiogenic and stable isotopes in petrology and their application to study of the evolution of the crust and mantle; isotopic evidence regarding the formation of the Earth and the solar system; and stable isotope and oxygen isotope use in geothermometry, ore petrogenesis, palaeontology, and the global climate system.

EAS 666 Applied Multivariate Statistics
Spring. 3 credits. Prerequisites: multivariate calculus, matrix algebra, and two previous courses in statistics. Offered alternate years. D. S. Wilks. Statistical techniques for multivariable data. Topics include multivariate EDA, the multivariate normal distribution, parametric and nonparametric inference about multivariate means, principal component analysis, canonical correlation analysis, discriminant analysis, and cluster analysis. Geophysical applications are emphasized, using primarily atmospheric and oceanographic data as examples, but the development is general enough to be of broader interest.

[EAS 675 Modeling the Soil-Plant-Air System (also CSS 675)]
Spring. 3 credits. Prerequisites: EAS/CSS 483 or equivalent. Offered alternate years. Next offered 2006. S. J. Riha. Introduction to the structure and use of soil-plant-atmosphere models. Topics covered 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. Use of soil-plant-atmosphere models for teaching, research, extension, and policy formation is discussed.
EAS 692 Special Topics in Atmospheric Science
Fall or spring. 1-6 credits. S-U grades optional. 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 695 Computer Methods in Geological Sciences
Fall, spring. 3 credits. L. Brown, B. L. Isacks. Independent research projects using state-of-the-art computational resources in the Department of Earth and Atmospheric Sciences. Possibilities include image and seismic processing, seismic and geomechanical modeling, GIS, use of interpretational workshops for 3-D seismic and satellite imagery, modeling fluid flow through complex media.

EAS 700-799 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 term to term. Contact appropriate professor for more information.

EAS 711 Upper Atmospheric and Space Physics
D. L. Hysell.

EAS 722 Advanced Topics in Structural Geology
R. W. Allmendinger.

EAS 731 Planetary Geodynamics, Active Tectonics, Volcanology, Earthquakes, and Geodesy
M. Pritchard.

EAS 733 Advanced Topics in Geodynamics
Spring. J. Phipps Morgan.

EAS 751 Petrology and Geochemistry
R. W. Kay.

EAS 755 Advanced Topics in Petrology and Tectonics
Fall. 3 credits. J. Phipps Morgan.

EAS 757 Current Research in Petrology and Geochemistry
S. Mahlburg Kay.

EAS 762 Advanced Topics in Paleobiology
W. D. Allmon.

EAS 771 Advanced Topics in Sedimentology and Stratigraphy
T. E. Jordan.

EAS 777 Advanced Topics in Oceanography
Spring. C. H. Greene.

EAS 777 Advanced Topics in Climate Dynamics
Spring. K. Cook.

EAS 780 Earthquake Record Reading
Fall. M. Barazangi.

EAS 781 Geophysics Exploration Seismology, Ground-Penetrating Radar
L. D. Brown.

EAS 783 Advanced Topics in Geophysics
B. L. Isacks.

EAS 789 Advanced Topics in Seismology
L. D. Brown.

EAS 793 Andes-Himalayas Seminar

EAS 795 Low Temperature Geochemistry

EAS 796 Geochemistry of the Solid Earth
W. M. White.

EAS 797 Fluid-Rock Interactions
L. M. Cathles.

EAS 799 Soil, Water, and Geology Seminar
Spring. L. M. Cathles, T. S. Steenhuis.

EAS 850 Master's-Level Thesis Research in Atmospheric Science
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students specifically in the master's program in atmospheric science.

EAS 850 Graduate-Level Dissertation Research in Atmospheric Science
Fall or spring. Credit by arrangement. S-U grades optional. Hours by arrangement. Graduate faculty. Limited to students admitted to candidacy in the atmospheric science Ph.D. program after the "A" exam has been passed.

EAS 891 Doctoral-Level Dissertation Research in Atmospheric Science
Fall or spring. Credit by arrangement. S-U grades optional. Hours by arrangement. Graduate faculty. Limited to students admitted to candidacy in the atmospheric science Ph.D. program after the "A" exam has been passed.

EAST ASIA PROGRAM

140 Uris Hall

The study of economics provides an understanding of the way economics operate and an insight into public issues. The department offers a broad range of undergraduate courses in such fields as money and banking; international and comparative economics; econometrics; theory; history, growth and development; and the organization, performance, and control of industry.

The Major

Prerequisites
ECON 101 and 102 and MATH 111 (or equivalents, with approval of the director of undergraduate studies), all with grades of C or better.

ECON 301 with a grade of C or better substitutes for 101: ECON 302 with a grade of C or better substitutes for 102.

Requirements
Eight courses listed by the Department of Economics at the 300 level or above, or approved by the student's major adviser, all with grades of C or better. (S-U grade option is not allowed.)

These eight courses must include:
1. ECON 313 and 314
2. ECON 321, or ECON 319 and 320 (ECON 313, 314, 321 or 319, 320 should be completed before senior year)
3. at least three courses from the following: 318, 320, 322-399
ECON 301 with a grade of B or better substitutes for both 101 and 313; ECON 302 with a grade of B or better substitutes for both 102 and 314.  
If ECON 321 is applied toward the major, neither 319 nor 320 can be applied.  
ECON 498 and 499 cannot be counted toward the eight-course requirement.  
If ECON 313 is applied to the major, ECON 301 cannot be.  
If ECON 314 is applied to the major, ECON 302 cannot be.  
If both ECON 367 and ECON 368 are taken, only one can be applied to the major.

An honors program is currently being offered.  
ECON 301 cannot be.

Students planning graduate work in Economics should select ECON 319-320 rather than 321 and should consider including some of the following courses in their majors:  
ECON 367, Game Theoretic Methods  
ECON 368, Game Theory  
ECON 416, Intertemporal Economics  
ECON 419, Economic Decisions under Uncertainty  
ECON 445–446, Topics in Microeconomic and Macroeconomic Analysis  

Students planning careers in business management should consider including some of the following courses in their majors:  
ECON 333, Financial Economics  
ECON 351 or 352, Industrial Organization  
ECON 361–362, International Trade and Finance  
ECON 440–441, Analysis of Agricultural Markets and Commodity Futures Markets.  
ECON 443, Personnel Economics for Managers

In addition to completing the Economics major, such students should also consider courses in accounting and subjects such as finance, marketing, entrepreneurship, business administration, and Business Law.  
Courses in these subjects are offered by the Department of Applied Economics and Management; the School of Hotel Administration; and the Johnson Graduate School of Management.  

Students planning to attend Law School should consider including some of the following courses in their majors:  
ECON 351 or 352, Industrial Organization  
ECON 354, Economics of Regulation  
ECON 361–362, International Trade and Finance  
ECON 404, Economics and the Law

In addition to completing the Economics major, such students should inquire at Career Services, College of Arts and Sciences, concerning recommended courses offered by other departments.

**Courses**

**ECON 101 Introductory Microeconomics (III) (SBA)**  
Fall, spring, winter, and summer. 3 credits.  
ECON 101 is not a prerequisite for 102.  
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 102 Introductory Macroeconomics (III) (SBA)**  
Fall, spring, winter, and summer. 3 credits.  
ECON 101 is not a prerequisite for 102.  
Analysis of aggregate economic activity in relation to the level, stability, and growth of national income. Topics discussed 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 230 International Trade and Finance (III) (SBA)**  
For description, see AEM 230.

**ECON 301 Microeconomics (III) (SBA)**  
Fall. 4 credits. Prerequisite: calculus.  
Intended for students with strong analytical skills who have not taken ECON 101, 102.  
Can be used to replace both ECON 101 and 313. (Can replace 313 only with grade of B or better.) This course covers the topics taught in ECON 101 and 313. An introduction to the theory of consumer and producer behavior and to the functioning of the price system.

**ECON 302 Macroeconomics (III) (SBA)**  
Spring. 4 credits. Prerequisite: ECON 301.  
Intended for students with strong analytical skills who have not taken ECON 101, 102.  
Can be used to replace both ECON 102 and 314. (Can replace 314 only with grade of B or better.) An introduction to the theory of national income determination, unemployment, growth, and inflation.

**ECON 307 Introduction to Peace Science (also CRP 495.18) (III) (SBA)**  
Winter session. 3 credits. Prerequisites: ECON 101–102 and 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 313 Intermediate Microeconomic Theory (III) (SBA)**  
Fall, spring, and summer. 4 credits.  
Prerequisites: ECON 101–102 and MATH 111–112.  
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 314 Intermediate Macroeconomic Theory (III) (SBA)**  
Fall, spring, and summer. 4 credits.  
Prerequisites: ECON 101–102 and MATH 111–112.  
The theory of national income and determination and economic growth in alternative models of the national economy is introduced. The interaction and relation of these models to empirical aggregate economic data is examined.

**ECON 319 Introduction to Statistics and Probability (II) (MQR)**  
Fall and spring. 4 credits. Prerequisites: ECON 101–102 and MATH 111–112.  
This course provides an introduction to statistical inference and to principles of probability. It includes descriptive statistics, principles of probability, discrete and continuous distributions, and hypothesis testing (of sample means, proportions, variance). Regression analysis and correlation are introduced.

**ECON 320 Introduction to Econometrics (II) (MQR)**  
Fall and spring. 4 credits. Prerequisites: ECON 101–102, 319, 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 321 Applied Econometrics (II) (MQR)**  
Fall. 4 credits. Prerequisites: ECON 101–102 and MATH 111–112.  
This course provides an introduction to statistical methods and principles of probability. Topics covered include analysis of data, probability concepts and distributions, estimation and hypothesis testing, regression, correlation, and time series analysis.  
Applications from economics are used to illustrate the methods covered in the course.

**ECON 322 World Economic History # (III) (HA)**  
Spring. 4 credits. Prerequisites: ECON 101 and 102 or the equivalent.  
An economist's perspective on the comparative evolution of selected economic and social institutions, with emphasis on trade, finance, population growth and technological change.

**ECON 323 American Economic History # (III) (SBA)**  
Fall. 4 credits. Prerequisites: ECON 101–102 or equivalent. Not offered 2004–2005.  
A survey of problems in American economic history from the first settlements to early industrialization are surveyed.

**ECON 324 American Economic History # (III) (SBA)**  
Spring. 4 credits. Prerequisites: ECON 101–102 or equivalent.  
A survey of problems in American economic history from the Civil War to World War I.

**ECON 325 Cross Section and Panel Econometrics (II) (MQR)**  
Spring. 4 credits. Prerequisite: ECON 320.  
This course is an introduction to cross-section and panel econometrics. Topics include multiple-regression analysis with qualitative information to model, simple and advanced panel data methods, informal variable, estimation, simultaneous equation models.

**ECON 327 Time Series Econometrics**  
Spring. 4 credits. Prerequisite: ECON 320.  
This course is an introduction to time-series econometrics. Topics include stationary time series, ARMA models, multivariate models, non-stationary models and unit roots, and co-integration.
ECON 331 Money and Credit (III) (SBA)
Spring. 4 credits. Prerequisites: ECON 101–102 and 313.
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 333 Financial Economics (III) (SBA)
Spring. 4 credits. Prerequisites: ECON 313 and 314.
The theory and decision making in the presence of uncertainty and the practical aspects of particular asset markets are examined.

ECON 335 Public Finance: The Microeconomics of Government (III) (SBA)
Fall. 4 credits. Prerequisites: ECON 101–102 and 313, or their equivalent, and one semester of calculus.
The role of government in a free market economy is analyzed. Topics include public goods, market failures, allocation mechanisms, optimal taxation, effects of taxation, and benefit-cost analysis. Current topics of an applied nature vary from term to term.

ECON 336 Public Finance: Resource Allocation and Fiscal Policy (III) (SBA)
Spring. 4 credits. Prerequisites: ECON 101–102, 313 or their equivalent and 1 semester of calculus.
This course covers the revenue side of public finance and special topics. Subjects covered 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 339 State and Local Public Finance (III) (SBA)
Spring. 4 credits. Prerequisites: ECON 313.
This course examines the role of subnational governments and jurisdictions in the economy. Among the broad questions addressed are: what tasks are normally assigned to local governments? What impact can such assignment have on efficiency and equity? How do inter-government financial relations affect these outcomes? The theory and evidence on these issues are analyzed, with frequent application to current issues, like debates surrounding local, school district-based provision of education.

ECON 341 Economics of Wages and Employment II (III)
For description, see ILRLE 440.

ECON 342 Economic Analysis of the University
For description, see ILRLE 608.

ECON 351 Industrial Organization I (III) (SBA)
Fall. 4 credits. Prerequisite: ECON 313 or its equivalent.
This course 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, R&D behavior, and government interventions in oligopoly industries (e.g., antitrust laws).

ECON 352 Industrial Organization II (III) (SBA)
Spring. 4 credits. Prerequisite: ECON 313 or its equivalent.
This course primarily focuses 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 354 The Economics of Regulation (III) (SBA)
Fall. 4 credits. Prerequisite: ECON 313 or equivalent.
Regulation constrains individual and institutional behavior. These interfaces between the private and public sectors are explored in terms of their rationale, efficacy, and economic consequences. Regulation is examined as a system of incentives that guides the development and efficient functioning of markets, that moulds the behavior of regulated industries like utilities and that elicits socially desirable levels of pollution, congestion, risk and beneficial externally-generated activities. How the various professionals (law, accounting and engineering) view and address these challenges are examined in light of their economic effects.

ECON 361 International Trade Theory and Policy (III) (SBA)
Fall. 4 credits. Prerequisites: ECON 101–102 and 314.
This course surveys the sources of comparative advantage. It 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 362 International Monetary Theory and Policy (III) (SBA)
Spring and summer. 4 credits.
Prerequisites: ECON 101–102 and 314.
This course surveys the determination of exchange rates and theories of balance of payments adjustments. It also explores open economy macroeconomics, and it analyzes some of the institutional details of foreign exchange markets, balance of payments accounting, and the international monetary system.

ECON 367 Game Theoretic Methods (III) (SBA)
Spring. 4 credits. Prerequisites: ECON 101 or equivalent. ECON 367 is not a prerequisite for ECON 368.
This course introduces students to the use of game-theoretic methods for the social sciences. This leads to an analysis of the social and political foundations of economics that prepares students to think strategically on social and economic matters and thus serves as a background for more advanced courses in economics, game theory, and related social sciences.

ECON 368 Game Theory (formerly ECON 467) (II) (MQR)
Fall. 4 credits. Prerequisites: ECON 313 and 319. ECON 367 is not a prerequisite for ECON 368.

ECON 371 Economic Development (III) (SBA)
Fall. 4 credits. Prerequisites: ECON 313 or equivalent.
Study of the problem of sustaining accelerated economic growth in less-developed countries. 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 are emphasized.

ECON 372 Applied Economic Development (III) (SBA)
Spring. 4 credits. Prerequisite: ECON 101–102.
This course examines several special topics in the economics of developing countries. Among the topics covered recently 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 versus market debate and the role of the state in economic development, and the question of sustainable development.

ECON 404 Economics and the Law (III) (SBA)
Fall. 4 credits. Prerequisite: ECON 101.
An examination, 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 405 Auction Seminar (II) (MQR)
Spring. 4 credits. Prerequisites: ECON 314, 319, 320, and 368.
This course uses theoretical and empirical methods to analyze bidding behavior in auctions. The first part of the course studies theoretical models of auctions. The role of private information is discussed in the context of two empirically important auction formats: the first-price–sealed-bid and the open-ascending-bid auction. Bid-shading and the winner’s curse are explained in these models. Optimal selling strategies as well as the issue of bidder collusion are analyzed. In the second part of the course, empirical evidence on these topics is discussed in the context of outer continental-shelf oil auctions, Internet auctions, and treasury bill and spectrum auctions. One session is devoted to an auction experiment in class. In the final part of the course, students present and debate the issues of their term papers. Readings will be assigned weekly from the reading packet.

ECON 408 Production Economics and Policy (III) (SBA)
For description, see AEM 608.

ECON 409 Environmental Economics (III) (SBA)
For description, see AEM 451.

ECON 415 Price Analysis (III) (SBA)
For description, see AEM 415.

ECON 416 Intertemporal Economics (III) (SBA)
Fall. 4 credits. Prerequisites: ECON 313.
This course studies mathematical models of conflict and cooperation in situations of uncertainty (about nature and about decision makers).

ECON 417 Economic Development (III) (SBA)
Fall. 4 credits. Prerequisites: ECON 313 or equivalent.
This course examines the determination of exchange rates and theories of balance of payments adjustments. It also explores open economy macroeconomics, and it analyzes some of the institutional details of foreign exchange markets, balance of payments accounting, and the international monetary system.
This course is intended for advanced economics majors who are especially interested in economic theory. Topics covered:

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 417 History of Economic Analysis (III) (HA)**

Spring. 4 credits. Prerequisites: ECON 101–102 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 419 Economic Decisions under Uncertainty (III)**

Fall. 4 credits. Prerequisites: ECON 313 and 319. Not offered 2004–2005. This course provides an introduction to the theory of decision making under uncertainty with emphasis on economic applications of the theory.

**ECON 420 Economics of Family Policy—Adults**

ECON 420 and 421 together, count as one course for the Economics major. For description, see PAM 320.

**ECON 421 Economics of Family Policy—Children**

ECON 420 and 421 together, count as one course for the Economics major. For description, see PAM 321.

**ECON 430 Policy Analysis: Welfare Theory, Agriculture, and Trade (III) (SBA)**

For description, see AEM 690.

**ECON 431 Monetary Economics (II) (MQR)**

Spring. 4 credits. Prerequisites: ECON 313 and 314. Not offered 2004–2005. This course is a course on monetary theory, history, and policy. Topics include transaction costs, centralized and bilateral trading, media of exchange, internal exchange and monetary arrangements, and central bank and its policy.

**ECON 434 Financial Economics, Derivatives, and Risk Management (III) (SBA)**

Summer only. 4 credits. Prerequisites: ECON 313. This course 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 440 Analysis of Agricultural Markets**

ECON 440 and 441 together, count as one course for the Economics major. For description, see AEM 690.

**ECON 441 Commodity Futures Markets**

ECON 440 and 441 together, count as one course for the Economics major. For description, see AEM 641.

**ECON 443 Personnel Economics for Managers**

For description, see ILRLE 433.

**ECON 444 Modern European Economic History**

For description, see ILRLE 444.

**ECON 445 Industrial Policy (III) (SBA)**

Fall. 4 credits. Prerequisite: ECON 313. The 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 *laissez-faire*; 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 Eastern Asian episodes; Komiya on the Japanese MITI—early successes/recent problems, Linsu Kim about Korean policy—are subsequent difficulties the necessary price for the early triumphs; industrial policy without protectionism (the cases of Singapore and Pernan, Malaysia)—viable approaches under the WTO rules; 4) present developments and implications; trade frictions (the export expansion of the PRC). environmental concerns.

**ECON 446 Topics in Macroeconomic Analysis—Is Keynesianism Dead? (III)**

Fall or spring. 4 credits. Prerequisites: ECON 314. Not offered 2004–2005. The coverage of this course may vary from term to term. Presently, the content of the course deals with the range of criticisms against Keynesian theory by the New Classical Economics, alias the Equilibrium School, alias the Rational Expectations School. Despite the fact that almost all intermediate economic system between the early 1990s and late 1990s.

**ECON 447 Economics of Social Security (III) (SBA)**

For description, see PAM 346.

**ECON 450 Resource Economics (III) (SBA)**

For description, see AEM 450.

**ECON 451 Economic Security (III) (SBA)**

For description, see ILRLE 340.

**ECON 453 The Economics of Unemployment (III) (SBA)**

For description, see ILRLE 448.

**ECON 454 Special Topics in Labor Economics**

For description, see ILRLE 440.

**ECON 455 Income Distribution (III) (SBA)**

For description, see ILRLE 441.

**ECON 456 The Economics of Employee Benefits (III) (SBA)**

For description, see ILRLE 422.

**ECON 457 Women in the Economy (III) (SBA)**

For description, see ILRLE 445.

**ECON 458 Topics in Twentieth-Century Economic History (III) (SBA)**

For description, see ILRLE 448.

**ECON 459 Economic History of British Labor 1750-1940 (III) (SBA)**

For description, see ILRLE 446.

**ECON 460 Economic Analysis of the Welfare State (III) (SBA)**

For description, see ILRLE 642.

**ECON 461 The Economics of Occupational Safety and Health (III) (SBA)**

For description, see ILRLE 644.

**ECON 464 Economics of Agricultural Development (III) (SBA)**

For description, see AEM 665.

**ECON 469 China's Economy under Mao and Deng @ (III) (SBA)**

Fall. 4 credits. Prerequisite: ECON 101–102 or permission of instructor. Examines the development of the Chinese economy and the evolution of China's economic system between the early 1990s and late 1990s.

**ECON 470 Economics of Information (also ECON 669) (II) (MQR)**

Spring. 4 credits. Prerequisite: ECON 101–102. This course studies theoretical models that examine the difficulties of resource allocation when this assumption fails. The course discusses models of auctions, adverse selection, bargaining, mechanism design, moral hazard, screening, searching and sorting. The course begins with a survey of rudimentary incomplete information games that is useful in reading the literature to follow. Evaluation is through problem sets and exams.

**ECON 473 Economics of Export-Led Development @ (III) (SBA)**

Spring. 4 credits. Prerequisites: ECON 313, 314, or their equivalent. This course 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 474 National and International Food Economics (III)**

For description, see FS 457.

**ECON 475 The Economy of India @ (III) (SBA)**

Fall. 4 credits. Prerequisite: ECON 101–102 or equivalent background. This course presents the major economics and development problems of contemporary India and examines the country's future economic prospects. It is, however, our aim to discuss these problems in their proper historical context.
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 476 Decision Theory I (also ECON 676 and CIS 576) (III) (MQR) Fall. 4 credits.

Research on decision theory resides in a variety of disciplines including computer science, economics, game theory, philosophy, and psychology. This course attempts to integrate these various approaches. The course is taught jointly by faculty from Game Theory and Computer Science. The course has several objectives. First, we cover 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. Second, we cover 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. Third, we cover 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 477 Decision Theory II (also ECON 677, CIS 577) (II) (MQR) Spring. 4 credits. Prerequisite: ECON 476 or 676 or CIS 576. A continuation of ECON 476.

ECON 494 Economic Methods for Engineering and Management For description, see CEE 594.

ECON 498 Independent Study in Economics Fall or spring. Variable credit. Independent study.

ECON 499 Honors Program Fall and spring. 8 credits. Prerequisites: ECON 313, 314, 521 (or 319-320). 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 609 Microeconomic Theory I Fall. 4 credits.

Topics in consumer and producer theory.

ECON 610 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 611 Microeconomic Theory III Spring. 4 credits. Prerequisites: ECON 609 and 610.

This class is a 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 Cournot, Bertrand, 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 the theory of mechanism design.

ECON 613 Macroeconomic Theory I Fall. 4 credits.

Course covers the following topics: static general equilibrium; intertemporal general equilibrium; infinitely lived agents models and overlapping generations models; welfare theorems; equivalence between segmented markets and Arrow-Debreu Markets; Ricardian proposition. Modigliani-Miller theorem; asset pricing; recursive competitive equilibrium; the Neoclassical Growth Model; calibration; and introduction to dynamic programming.

ECON 614 Macroeconomic Theory II Spring. 4 credits.

Course 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 617 Intermediate Mathematical Economics I Fall. 4 credits. Prerequisites: calculus II and intermediate linear algebra.

The course 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 618 Intermediate Mathematical Economics II Spring. 4 credits.

A continuation of ECON 617. The course 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 619 Econometrics I Fall. 4 credits. Prerequisites: ECON 319- 520 or permission of instructor.

This course gives the probabilistic and statistical background for meaningful application of econometric techniques. Topics include probability theory, regression, correlation, and time series analysis. Statistics: estimation, 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 639 Public Political Economy (also CEE 528) Spring. 4 credits. Prerequisites: ECON 313 or equivalent.

Topics covered include the intrinsic nature of goods and services, decreasing cost of production, externalities, and congestion, attributes and government regulation essential for an effective market, the efficient role of government in non-market resource allocation methods, methods for inferring the demand for public goods, efficient public decision-making, the supply of public services and raising revenue through taxes and user-fees. Particular emphasis is placed on the interaction between fairness and efficiency in resolving conflicts over public good provision, including defining jurisdictions for the provision of particular services. Examples emphasize the public provision of infrastructure services (physical transportation, utilities, tele-information); human-capital (education and R&D); and biological (renewable resources, species diversity and the environment).

ECON 669 Economics of Information (also ECON 477) Spring. 4 credits. Prerequisite: ECON 609. For description, see ECON 470. Students enrolled in ECON 669 will have different grading exercises than those enrolled in ECON 470.

ECON 676 Decision Theory I (also CIS 576) For description, see ECON 477.

ECON 677 Decision Theory II (also CIS 577) For description, see ECON 477.

ECON 691 Health Economics I For description, see PAM 691.

ECON 699 Readings in Economics Fall or spring. Variable credit. Independent study.

ECON 703 Seminar in Peace Science Fall. 4 credits.

Among the topics covered at an advanced level are game theory are: coalition theory, bargaining and negotiation processes, cooperative procedures, microbehavior models, macrosocial processes, and general systems analysis.


This course 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; dynamic models of price adjustment, etc. Advanced graduate students contemplating work in economic theory and econometric theory gain exposure to current research.
ECON 712 Advanced Macroeconomics
Fall. 4 credits. Prerequisites: ECON 613, 614.
The purpose of this course is to introduce students to some of the topics and analytic techniques of current macroeconomic research. The course falls into three parts: dynamic programming, new keynesian economics, and recent theories of economic growth. The dynamic programming section includes models of consumption, investment, and real business cycles. The new Keynesian section covers models of wage and price rigidity, coordination failure, and credit markets. The section on endogenous growth looks at recent efforts to do nonconvexities to models of optimal growth. These topics are intended to complement the material on overlapping generations covered elsewhere.

ECON 713 Advanced Macroeconomics II
Spring. 4 credits. Prerequisites: ECON 613, 614.
This course 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 papers 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 published on issues such as learning by doing, R&D investment, market structure, private and public organization of R&D, 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 714 Empirical Macroeconomics
Spring. 4 credits. Prerequisites: ECON 613 and 614.
This advanced graduate-level macroeconomics course emphasizes 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 717 Mathematical Economics
4 credits. Prerequisites: ECON 609-610 (or equivalent training in micro theory) and MATH 413-414 (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 719 Advanced Topics in Econometrics I
Fall. 4 credits. Prerequisites: ECON 619-620 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 720 Advanced Topics in Econometrics II
Spring. 4 credits. Prerequisites: ECON 619-620 or permission of instructor.
This course 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 722 Topics in Time Series Econometrics
Spring. 4 credits. Prerequisite: ECON 721.
This course covers topics not treated by ECON 721. These include: non-stationary, fractionally integrated, long memory, and ARCH/GARCH models. Other topics may also be considered based on the interests of the students.

ECON 723 Semi/Non Parametric Econometrics
Fall. 4 credits. Prerequisite: ECON 619-620 or permission of instructor.
This course 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 731 Monetary Economics
Spring. 4 credits. Prerequisites: ECON 614 or permission of the instructor.
Covers advanced topics in monetary economics, macroeconomics, and economic growth—including overlapping-generations, taxes and transfers denominated in money, transactions demand for money, multi-asset accumulation, exchange rates, and financial intermediation.

ECON 732 Monetary Economics
Fall. 4 credits. Prerequisites: ECON 731 or permission of the instructor.
Covers advanced topics in monetary economics, macroeconomics, and economic growth—including 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 735 Public Finance: Resource Allocation and Fiscal Policy (also AEM 735)
Fall. 4 credits.
This course 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 covered include generalizations and extensions of the fundamental theorems of welfare economics, in-depth analysis of social choice theory and the theory on implementation in economic environments, public goods and externalities and other forms of market failure associated with asymmetric information. The theoretical foundation for optimal direct and indirect taxation is also introduced along with the development of various consumer surplus measures and an application to benefit cost analysis. Topics of an applied nature vary from semester to semester depending on faculty research interests.

ECON 736 Public Finance: Resource Allocation and Fiscal Policy
Spring. 4 credits.
This course 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 737 Location Theory and Regional Analysis
Fall. 4 credits. Prerequisites: ECON 609, 617, and Econometrics. Not offered 2004-2005.
Covers economic principles influencing the location of economic activity, its spatial equilibrium structure, and dynamic forces. Topics include spatial price adjustment, price competition, and relocation by firms; residential location patterns; patterns of regional growth and decline; and patterns of urbanization.

ECON 738 Public Choice
Spring. 4 credits. Prerequisites: ECON 609, 610.
This class has two parts. It begins with an introduction to economic theories of political decision making. We review the theory of voting, theories of political parties and party competition, theories of legislative decision making and interest group influence. We also discuss empirical evidence concerning the validity of these theories. The second part uses these theories to address a number of issues in public economics. We develop the theory of political failure, analyze the performance of alternative political systems and discuss the problem of doing policy analysis which takes into account political constraints.
ECON 739 Advanced Topics in State and Local Public Finance
Spring. 4 credits. Prerequisites: ECON 609, 610.
This course 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 741 Seminar in Labor Economics
For description see ILRLE 744.
ECON 742 Seminar in Labor Economics
For description see ILRLE 745.
ECON 743 Seminar in Labor Economics
For description see ILRLE 746.
ECON 745 Economics of Higher Education
For description, see ILRLE 743.
ECON 746 Economics of Higher Education
For description, see ILRLE 747.
ECON 747 Economics of Higher Education
For description, see ILRLE 747.
ECON 748 Applied Econometrics I
For description, see ILRLE 741.
ECON 749 Applied Econometrics II
For description, see ILRLE 742.
ECON 751 Industrial Organization and Regulation
Fall. 4 credits. Prerequisites: ECON 609, 610.
This course focuses primarily on recent theoretical advances in the study of industrial organization. Topics covered include: market structure, nonlinear pricing, quality, durability, location selection, repeated games, collusion, entry deterrence, managerial incentives, switching costs, government intervention, and REITs. These topics are discussed in a game-theoretic context.
ECON 752 Industrial Organization and Regulation
Spring. 4 credits. Prerequisites: ECON 609, 610, 751.
This course rounds out some topics in the theory of industrial organization with the specific intent of addressing the empirical implications of the theory. The course reviews empirical literature in the SCP paradigm and in the NEIO paradigm.
[ECON 753 Public Policy Issues for Industrial Organizations
Spring. 4 credits. Prerequisites: ECON 609, 610, and 751. Not offered 2004–2005. The course takes an in-depth view of the interaction between the government and business. Methods of business control, including antitrust, price regulation, entry regulation, and safety regulation. Emphasis will be not only on the economic effects on business, but on the economics of selecting and evolving the method of control.]
ECON 756 Noncooperative Game Theory
Fall. 4 credits. Prerequisites: ECON 609–610 and 619.
This course surveys equilibrium concepts for noncooperative games. We cover Nash equilibrium and a variety of equilibrium refinements, including perfect equilibrium, proper equilibrium, sequential equilibrium and more! We pay attention to important special classes of games, including bargaining games, signalling games, and games of incomplete information. Most of our analysis is from the strict decision-theoretic point of view, but we also survey some models of bounded rationality in games, including games played by automata.
ECON 757 Economics of Imperfect Information
Spring. 4 credits. Prerequisites: ECON 609–610 and 619.
The purpose of this course is to consider some major topics in the economics of uncertainty. 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 758 Psychology and Economic Theory
Fall, spring. 4 credits. Prerequisites: graduate core or instructor's permission. This course explores the ways in which insights from psychology can be integrated into economic theory. Evidence is presented on how human behavior systematically departs from the standard assumptions of Economics and how this can be incorporated into modeling techniques.
ECON 760 Topics in Political Economy
Fall. 4 credits. Prerequisite: economics graduate core or instructor's permission. This course 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 classical works of political economy, recent advances in game theory and, more generally, game-theoretic thinking allows us to approach these topics from a new perspective. Hence, the course begins by devoting some lectures to elementary ideas in game-theory and strategic analysis.
ECON 761 International Economics: Trade Theory and Policy
Fall. 4 credits. Prerequisites: ECON 609, 610.
This course surveys the sources of comparative advantage. It 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 762 International Economics: International Finance and Open Economy Macroeconomics
Spring. 4 credits. Prerequisite: ECON 761.
This course surveys the determination of exchange rates and theories of balance of payment adjustments. It explores open economy macroeconomics by analyzing models of monetary economies. Topics in monetary economics and econometrics as applied to international economics are covered.
ECON 763 Topics in International Economic History
Spring. 4 credits. Prerequisite: a solid understanding of international trade and finance. This course will cover selected topics in modern economic history. The focus will be on the process of international economic integration, or globalization. We will trace the roots of globalization and its evolution in the last several centuries. Special attention will be paid to the relationship between international market integration and economic growth.
ECON 770 Topics in Economic Development
For description, see AEM 667.
Spring. 4 credits. Prerequisites: ECON graduate core.
This course is focused on empirical methods for the analysis of household survey data. It explores the hands-on use of such data to address policy issues related to welfare outcomes, particularly nutrition, health, education, and poverty. The course covers empirical methods as they apply to a series of measurement and modeling issues, as well as the valuation of interventions. While we briefly review underlying theory, 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 772 Economics of Development
Spring. 4 credits. Prerequisites: first-year graduate economic theory and econometrics.
Analytical approaches to the economic problems of developing nations. Topics to be covered 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 773 Economic Development
Fall. 4 credits. Prerequisites: ECON 609, 610, and 611.
The course is concerned with theoretical and applied works that seek to explain economic development, or lack thereof, in countries at low-income levels. Specific topics vary each semester.
ECON 774 Economic Systems
Spring. 4 credits.
The course deals with economic systems, formerly centrally planned economies, and economies in transition.
ECON 776 Seminars in Advanced Economics
Fall and spring. 4 credits.
ENGLISH


The Department of English offers a wide range of courses in English, American, and Anglophone literature as well as in creative writing, expository, 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, cultural, and intellectual contexts and to other disciplines. Writing courses typically employ the workshop method in which students develop their skills by responding to the criticism of their work by their classmates and by the professor, and by 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 rigor and the pleasures of reading texts of many sorts.

First-Year Writing Seminars

As part of the university-wide First-Year Writing Seminars program administered by the John S. Knight Institute for Writing in the Disciplines, the department offers many one-semester courses dealing with various forms of writing (e.g., narrative, autobiographical, and expository), with the study of specific areas in English and American literature, and with the relation of literature to culture. Students may apply any of these courses to their First-Year Writing Seminar requirement. Detailed course descriptions may be found in the First-Year Writing Seminars program listings, available from college registrars in August for the fall term and in November for the spring term.

Freshmen interested in majoring in English are encouraged to take at least one of the department's 200-level First-Year Writing Seminars: The Reading of Fiction (ENGL 270), The Reading of Poetry (ENGL 271), and Introduction to Drama (ENGL 272). These courses are open to all second-term freshmen. They are also open, as space permits, to first-term freshmen with scores of 700 or above on the CEEB College Placement Tests in English composition or literature, or 4 or 5 on the CEEB Advanced Placement Examination in English, as well as to students who have completed another First-Year Writing Seminar.

Courses for Nonmajors

For students majoring in fields other than English, the department provides a variety of courses at all levels. A number of courses at the 200 level are open to qualified freshmen, and all are open to sophomores. Courses at the 300 level are open to all sophomores, juniors, and seniors; they are also open to freshmen who have received the instructor's prior permission. The suitability of courses at the 400 level for nonmajors depends in part on the course topics, which are subject to change from year to year. Permission of the instructor is sometimes required; prior consultation is always in order and strongly advised.

The Major in English

Students who major in English develop their own programs of study in consultation with their major advisers. Some choose to focus on a particular historical period or literary genre or to combine sustained work in creative writing with the study of literature. Others pursue interests in women's literature, African-American 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 The Reading of Fiction (ENGL 270), The Reading of Poetry (ENGL 271), or Introduction to Drama (ENGL 272). 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—reader-responsive, sensitive reading and lucid, strong writing. As First-Year Writing Seminars, any one of them will satisfy one-half the College of Arts and Science's First-Year writing requirement. ENGL 280, 281, 288, and 289, and most courses in literature, African-American literature, literature and creative writing offered by academic departments unless they are cross-listed with English. Advanced courses in foreign literature may be used for English major credit provided they are included within the 12-credit limit described below. The three-course concentration requirement may be satisfied with any courses approved for the major. The department's "Guide to the English Major" suggests areas of concentration and offers examples of courses that fall within those areas, but majors define their own concentrations in consultation with their advisers.

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, African Studies, the Society for the Humanities, American Studies, Feminist, Gender and Sexuality Studies, Religious Studies, Asian American Studies, Latino Studies, and Theatre, Film, and Dance) are routinely counted toward the 40 hours of major credit provided they are appropriate for juniors or seniors, as are most courses at the 300 level and above. English majors who are double majors may exercise this option even if all 12 credits are applied to their second major. All English majors are urged to take courses in which they read foreign works of literature in the original language.

The Major in English with Honors

Second-term sophomores who have done superior work in English and related subjects are encouraged to seek admission to the department's program leading to the degree of Bachelor of Arts with Honors in English. Following an interview with the chair of the Honors Committee, qualified students will be admitted provisionally to the program.
their junior year these students complete at least one Honors Seminar (ENGL 491 or 492) and are encouraged to take an additional 400-level English course in the area of their thesis topic. Of the rich variety of poems written in English and other English courses, a provisional Honors candidate is expected to select a thesis topic and secure a thesis adviser by the end of the junior year. A student who has been accepted by a thesis adviser 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 493–494) with the faculty member chosen as thesis adviser. 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 270 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 novel. Students write critical essays on authors who flourished between 1870 and the present, such as James, Joyce, Woolf, Hurston, Lawrence, Fitzgerald, Hemingway, Faulkner, Ibsen, Welty, Salinger, and Morrison. Reading lists vary from section to section, and some may include a novel, but close, attentive, imaginative reading and writing are central to all.

ENGL 271 The Reading of Poetry
Fall, spring. 3 credits. Each section limited to 17 students. Recommended for prospective majors in English. 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 Dickinson to A. R. Ammons. We may read songs, sonnets, odes, and epistles, even limericks. By engaging in thorough discussions and varied reading 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 272 Introduction to Drama
Fall, spring. 3 credits. Each section limited to 17 students. Recommended for prospective majors in English. This course does not satisfy requirements for the English major.

Students in this seminar study plays, older and newer, in a variety of dramatic idioms and cultural traditions. Plays being performed by the theatre department will be included, if possible. A typical reading list might include works by Sophocles, Shakespeare, Chekhov, Brecht, Miller, Beckett, and Shange. Course work consists of writing and discussion and the occasional viewing of live or filmed performances.

Expository Writing

ENGL 288–289 Expository Writing (IV) (LA)
Fall, spring, summer, and winter. 3 credits. Each section limited to 16 students. Students must have completed their colleges' first-year writing requirements or have the permission of the instructor. S. Davis and staff. ENGL 288–289 offers guidance and an audience for students who wish to gain skill in expository writing. Each section provides a context for writing defined by a form of exposition, a discipline, a subfield of interest, or some other 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 work. Since these seminar-sized courses depend on members' full participation, regular attendance, and submission of written work are required. Students and instructors will confer individually throughout the term. Entry to ENGL 288–289 does not satisfy requirements for the English major. See http://instruct1.cit.comell.edu/Courses/engl288-289/ for descriptions of the individual sections:

Sec 1 Hollywood and the Art Film—N. Davis.
Sec 2 The Reflective Essay—S. Adcock.
Sec 3 Gangsters, Hippies, Punks, and Ravers: American Subcultures—J. Kuszai.
Sec 5 Media Events: Making Stories in Fact and Fiction—A. Naimou.
Sec 6 Issues, Audiences, and Ourselves—B. LeGendre.
Sec 7 Making the News—J. Carlacio.
See English department course offerings for full fall and spring section descriptions. This course does not satisfy requirements for the English major.

ENGL 381 Reading As Writing (IV) (LA)
Fall. 4 courses. Limited to 15 students. Prerequisite: ENGL 280–281. ENGL 381–382 and 384–385 are approved for the English major. For completion of the English major. It is a Writing Seminar requirement. Limited to 18 students.

ENGL 386 Philosophic Fictions (IV) (LA)
Spring. 4 credits. Course limited to 15 students. Prerequisite: permission of the instructor on the basis of a writing sample (critical/interpretive prose), which should reach the instructor before the first day of class. S. Davis. "Fictions"—of voice, audience, plot, point of view, figurative language, and thought—abound in good expository writing; they stand out in works that deliberately test and play with ideas: dialogues, satires, parodies, parables, philosophic tales, and "thought-experiments." Students will write critically about such works they raise and will experiment with writing in similar forms. The "fictions" read and written in this course are not realistic narratives or evocations of personal experience; they are the vehicles and animating resources of writers who want to argue flexibly, provoke thought, ridicule vice or folly, play games, or involve readers in pleasingly or disturbingly insoluble problems. Readings will include such works as Plato's "Sophist," Swift's "Modest Proposal" and Voltaire's "Candide," Carroll's Alice books, distopias by Ursula Le Guin and Caryl Churchill, short fictions by Jorge Luis Borges and Octavia Butler, and essays by Richard Rorty and Martha Nussbaum.

ENGL 397 Autobiography: Theory and Practice (IV) (LA)
Spring. 4 credits. Limited to 15 students. By permission of instructor on the basis of a writing sample. Interested students should submit one or more pieces of recent writing (prose) to the instructor before the beginning of the term, preferably at pre-enrollment. L. Fukundji.

ENGL 398 The Art of the Essay (IV) (LA)
Fall. 4 courses. Limited to 15 students. By permission of instructor on the basis of a writing sample. Interested students should submit one or more pieces of recent writing (prose) to the instructor before the beginning of the term, preferably at pre-enrollment. L. Fukundji.

ENGL 399 Creative Writing
Fall, spring, summer, and winter. 3 credits. Fall, spring, summer, and winter. 3 credits. Each section limited to 15 students. Prerequisite: permission of the instructor on the basis of a writing sample. Interested students should submit one or more pieces of recent writing (prose) to the instructor before the beginning of the term, preferably at pre-enrollment. L. Fukundji.

ENGL 400 Creative Writing Seminar
Fall, spring, summer, and winter. 3 credits. Fall, spring, summer, and winter. 3 credits. Each section limited to 15 students. Prerequisite: permission of the instructor on the basis of a writing sample. Interested students should submit one or more pieces of recent writing (prose) to the instructor before the beginning of the term, preferably at pre-enrollment. L. Fukundji.

Creative Writing

Students usually begin their work in Creative Writing with ENGL 280 or 281, and only after completion of the First-Year Writing Seminar requirement. Please note that either ENGL 280 or ENGL 281 is the recommended prerequisite for 300-level creative writing courses. ENGL 280 and 281 may satisfy a distribution requirement in your college (please check with your college adviser). ENGL 382–383, 384–385, and 480–481 are approved for the English major.

ENGL 280–281 Creative Writing (IV) (LA)
Fall, spring, summer, winter. 3 credits. Prerequisite: completion of the First-Year Writing Seminar requirement. Limited to 18 students. Majors and prospective majors, please note. Although recommended for prospective English majors, ENGL 280–281 cannot be counted toward the 40 credits required for completion of the English major. It is a prerequisite for 300-level courses in creative
An introductory course in the theory, practice, and reading of prose, poetry, and allied forms. Students are given the opportunity to try both prose and verse writing and may specialize in one or the other. Meetings of the class are conducted as workshops.

**ENGL 280-281** The English Literary Tradition: World Literatures in English (IV) (LA)

Fall 280, spring 281. 4 credits. Prerequisite: 280 or permission of instructor. An introductory survey of English literature from the late eighteenth century to the start of the twentieth century. We begin with the satires of the Restoration and eighteenth century including Pope's mock epic, The Rape of the Lock, Swift's Gulliver's Travels, and selections from Johnson's poems and criticism. Selections from the writings of the Romantic era include Blake's Illuminated Books, Songs of Innocence and Songs of Experience, and poems of Wordsworth, Coleridge, Shelley, and Keats, along with a novel by Jane Austen. We end with dramatic monologues and other lyrics from the Victorian era including Tennyson, Browning, Arnold, and Hopkins, plus Wilde's play The Importance of Being Earnest. Lectures are supplemented by small discussion groups once a week. Short creative exercises introduce techniques of close reading and approaches to literary language and style.

**ENGL 202** The English Literary Tradition: World Literatures in English (IV) (LA)

Fall 202, spring 203. 4 credits. Prerequisite: 201 not a prerequisite for 202, may be used as one of the three pre-1800 courses required of English majors. D. Fried.

A seminar course in the history and development of English literature, examining its historical development and achievements from its beginnings to the middle of the twentieth century. Focus is on the close reading of major works from a range of genres and modes, including heroic epic, romantic fiction, history play, sonnet sequence, love lyric, court masque, pastoral, and epic. Readings include Beowulf; Sir Gawain and the Green Knight; selections from Chaucer's Canterbury Tales; Elizabethan sonnets; Shakespeare's Henry IV, Part 1, poems by Donne, Marvell, and Herbert, and selections from Milton's Paradise Lost. Students will do some short creative exercises designed to highlight features of language and style, as well as write two four to five-page papers in critical analysis. Lectures and small weekly discussion sections.

**ENGL 282** A Key in to the Language of America; An Introduction to Literary Studies (IV) (LA)

Fall 282, spring 283. 4 credits. Prerequisite: ENGL 280 or permission of instructor. The manuscript should be submitted to the instructor no later than the first day of class. Previous enrollment in ENGL 280 or 281 and at least one 300-level writing course recommended. Successful completion of one half of 480-481 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, L. Vann-Cleef Stefanon; sec 2, P. Janowitz. Spring: sec 1, A. Fulton; sec 2, K. McClane. The writing of poetry; study of models; analysis of students' poems; personal conferences.

**ENGL 283** Seminar in Writing (IV) (LA)

Fall 283, spring 284. 4 credits. Each section limited to fifteen students. Prerequisite: ENGL 280 or 281 and permission of instructor based on submission of a manuscript (bring manuscript on first day of class). Fall: sec 1, S. Vaughn; sec 2, D. McCall; sec 3, R. Morgan. Spring: sec 1, J. R. Lennon; sec 2, S. Vaughn; sec 3, M. McCoy; sec 4, H. Viramontes. The writing of fiction; study of models; analysis of students' work.

**ENGL 284** Seminar in Writing (IV) (LA)

Fall 284, spring 285. 4 credits. Each section limited to fifteen students. Prerequisite: ENGL 280 or 281 and permission of instructor based on submission of a manuscript. The manuscript should be submitted to the instructor no later than the first day of class. Previous enrollment in ENGL 280 or 281 and at least one 300-level writing course recommended. Successful completion of one half of 480-481 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, L. Herrin, sec 2, R. Morgan; spring: P. Janowitz, M. McCoy. Intended for those writers who have already gained a basic mastery of technique. Although ENGL 480 is not a prerequisite for ENGL 481, students normally enroll for both terms 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 201-202** The English Literary Tradition: World Literatures in English (IV) (LA)

Fall 201; fall 201 fails. 4 credits. ENGL 201, not a prerequisite for 202, may be used as one of the three pre-1800 courses required of English majors. D. Fried.

A seminar course in the history and development of English literature, examining its historical development and achievements from its beginnings to the middle of the seventeenth century. Focus is on the close reading of major works from a range of genres and modes, including heroic epic, romantic fiction, history play, sonnet sequence, love lyric, court masque, pastoral, and epic. Readings include Beowulf; Sir Gawain and the Green Knight; selections from Chaucer's Canterbury Tales; Elizabethan sonnets; Shakespeare's Henry IV, Part 1, poems by Donne, Marvell, and Herbert, and selections from Milton's Paradise Lost. Students will do some short creative exercises designed to highlight features of language and style, as well as write two four to five-page papers in critical analysis. Lectures and small weekly discussion sections.

**ENGL 203** Introduction to American Literatures (also AM ST 206) (IV) (LA)

Fall 203; spring 204. 4 credits. Each section limited to fifteen students. Prerequisite: ENGL 201 not a prerequisite for 202, may be used as one of the three pre-1800 courses required of English majors. D. Fried.

An introductory survey of American literature from the late nineteenth century to the start of the twentieth century. We begin with the satires of the Restoration and eighteenth century including Pope's mock epic, The Rape of the Lock, Swift's Gulliver's Travels, and selections from Johnson's poems and criticism. Selections from the writings of the Romantic era include Blake's Illuminated Books, Songs of Innocence and Songs of Experience, and poems and prose of Wordsworth, Coleridge, Shelley, and Keats, along with a novel by Jane Austen. We end with dramatic monologues and other lyrics from the Victorian era including Tennyson, Browning, Arnold, and Hopkins, plus Wilde's play The Importance of Being Earnest. Lectures are supplemented by small discussion groups once a week. Short creative exercises introduce techniques of close reading and approaches to literary language and style.

**ENGL 204** Introduction to American Literatures: The Making of America: Reconstruction to the Present (also AM ST 207) (IV) (LA)

Spring 204. 4 credits. C. Caraclo.

The Civil War marked an important moment in America's growth as it attempted to come to terms with its past of racialized and colonialist imperialism. And yet, the country continued to struggle to identify itself not only broadly as a democratic nation but also specifically as a "melting pot" of individuals fighting for their civil and sovereign rights. We examine texts that speak directly to these issues. For example, we study how Americans, through prose, poetry, and fiction, used writing to exemplify and articulate their desire for citizenship as well as for the right to act out a politics of difference. To this end, we read both canonical and extra-canonical texts that engage in a conversation about these issues, such as those authored by Native Americans, including Madamah, Welch, and Vizenor; African Americans, including Harper, Washington, du Bois, Hurston, Hughes, Walker, Ellison, Lorde, and Morrison, Asian Americans, including Lee, Chin, and Mukupe; Latino/a Americans, including Acosta, Anzaldúa, and Cinéres; Jewish Americans including Spiegelman; and, of course, Anglo-Americans, including Chopin, Gilman, Wharton, Faulkner, Hemingway, O'Connor, Carver, Vizenor; and others. This course, intended only as a survey of American literature since the Civil War, blends lecture with discussion and includes several short and long writing assignments.

**ENGL 205** Introduction to World Literatures in English (IV) (LA)

Spring 205. 4 credits. E. Deloughery.

In this course we read contemporary literature from Africa, the Caribbean, the Middle East, South Asia, and the Pacific Islands (including New Zealand). We examine how literatures produced in the former colonies of the British Empire are in dialog with each other, and how they inscribe the complex relationship between native traditions and western colonialism. The course is particularly concerned with how writers from former colonies of the British Empire represent local identities (the intersections between gender, sexuality, nation, ethnicity, and religion) help us understand the global production of "world literature." Authors may include Chinua Achebe, Patricia Grace, Jamaica Kincaid, Mutabaruka, Bapu Sidhwa, and Derek Walcott.

Falls Declaration of Sentiments. Henry David Thoreau's "Resistance to Civil Government," Ape's "Eulogy on King Philip"; legal cases (Cherokee Nation v. Georgia and Dred Scott v. Sandford); ethnographies (Roger Williams' A Key into the Language of America; and Lewis Henry Morgan's League of the Iroquois); essays (Ralph Waldo Emerson); poetry (Phillis Wheatley, Walt Whitman, Emily Dickinson, and fiction (James Fenimore Cooper, Herman Melville, Edgar Allen Poe, Lydia Maria Child, Harriet Beecher Stowe, Catherine Maria Sedgwick, Harriet Wilson, Martin Delany, and John Rollin Ridge).
ENGL 206 Novels and Other Narratives (IV) (LA)  
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. W. Jones. While we might find it hard to imagine a world without novels, the novel as we know it in Anglo-American culture emerged relatively recently, in eighteenth-century England. And while individual novels certainly differ in scope and subject, the genre nevertheless still can be characterized by its emphasis on morality and realism, concerns that have much to do with its history. We look at how historical and social factors in the middle-eighteenth century, including the prominence of middle-class ethics and the development of print culture, gave rise to concerns that the novel addressed both in its form and content, and which continue to be relevant today. We also examine a critical vocabulary with which to talk about novels and other forms of narrative. Readings are likely to include works by Haywood, Defoe, Richardson, Austen, and Bronie (Emily).

[ENGL 207 Introduction to Modern Poetry (IV) (LA)]  

ENGL 208 Shakespeare and the Twentieth Century (IV) (LA)  
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. S. Davis. What can we learn about Shakespeare's plays from their reception in the twentieth century? What can we learn about twentieth-century cultures from their appropriations of these texts and their reinventions of Shakespeare? We compare four or five plays with their adaptations in film and theatre and explore the uses made of Shakespeare in education, advertising, and public culture. We confront the vast differences and startling continuities between the Shakespeare handed down by earlier times and the Shakespeare recovered or invented in the modern era; we also pay attention to the variety of critical approaches readers and viewers have taken to Shakespeare on the page and in performance. For spring 2005, tentatively: Romeo and Juliet, Titus Andronicus, Othello, Macbeth, and Tempest, and plays by Vogel, Stoppard, and Césaire; and films or stage productions directed by Lurhmann, Madden, Taymor, Kurosawa, Suzman, and Greenaway.

ENGL 209 Introduction to Cultural Studies (IV) (CA)  
Fall. 4 credits. B. Correll. Ads, advice-columns, reality shows, MTV, salsa, hip-hop, films and more bombard our thoughts and senses with encoded messages. This course looks closely at many kinds of culture that we encounter in our everyday lives and introduce students to some of the key critical work that has been written about them. Examples come from a range of texts, both "high" and "low," visual and literary, contemporary and historical. The course follows a lecture-discussion format.

ENGL 227 Shakespeare # (IV) (LA)  
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. B. Correll. A lecture and discussion course that offers students a survey of representative Shakespearean comedies, tragedies, and history plays. Our study includes attention to forms, themes, and historical contexts, including history of the early modern English theatre.

ENGL 295 The Essay in English # (IV) (LA)  
Fall. 4 credits. Prerequisite: completion of the first-year writing seminar requirement. This course may be used as one of the three pre-1800 courses required of English majors. L. Fadimondi. What is an essay? How does it work as prose discourse, as a text of the self? Impelled by such generic questions and others first raised by Montaigne's French Essais (1588), this course explores the invention of the essay in English during the sixteenth and seventeenth centuries, its flowering in the periodicals and magazines of the eighteenth and early nineteenth centuries, and its subsequent permutations across the English-speaking world. Readings include selections from the work of Bacon, Cornwallis, Donne, Earle, Cowley, Swift, Addison, Johnson, Franklin, Goldsmith, Lamb, Hazlitt, and Irving. Essays by earlier writers are matched rhetorically or thematically with readings from more recent practitioners of the genre, including DuBois, Woolf, Orwell, Welty, Baldwin, Selzer, Ozick, Achebe, Didion, Sa, Naipaul, Dillard, Sanders, and others. This is a class for students interested in reading essays and in thinking about how this nonfiction prose genre accommodates the range of discursive possibilities from narration and description to exposition and argument. No special background in literary history is assumed.

Major Genres and Areas

[ENGL 240 Survey in U.S. Latino Literature (also LSP 240 and AM ST 240) (IV) (LA)]  

ENGL 244 Sophomore Seminar: Studies in Irish Culture (IV)  
Fall. 4 credits. Limited to 15 students. S. Siegel. This seminar traces the history of Anglo-Irish relations before and after the Act of Union (1801). It is keyed to the Cromwellian invasions and their repercussions; the linguistic predicament in Ireland; the place of the theatre in eighteenth-century Dublin; Dublin's view of itself as a cultural center of Europe; the Great Irish Famine; the emergence of the Republic of Ireland (1921); varieties of Irish music; Irish filmmakers, and their subjects; and the Irish diaspora. Readings in contemporary historiography supplement primary material drawn from Irish newspapers, periodicals, and government documents.

We ask two questions as we view the artwork and architecture of Ireland and read Irish dramatists, poets, and novelists. One concerns our own assumptions; the second concerns those of others. How are we to understand the relation of the history of the time to the art of the time? And what were the various responses the inhabitants of Ireland gave to themselves when they asked who the Irish are, how to address that question, and who speaks for "Ireland"?

This is a special seminar sponsored by the John S. Knight Institutes Sophomore Seminars Program Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the disciplines outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

ENGL 251 Twentieth-Century Women Writers (also FGSS 251 and AM ST 252) (IV) (LA)  
Spring. 4 credits. K. McCullough. What or who is a "woman writer"? What is "American literature" and what, indeed, is "America"? What, finally, is the relation among these categories? These are the basic questions from which this course will proceed. We will focus our attention on issues of both individual and national identities and the impacts in them of structuring national discourses such as region, race, gender, sexuality, class, and ethnicity. Authors under consideration may include the following: Nella Larson, Dorothy Allison, Louise Erdrich, Toni Morrison, Helene Maria Viramontes, Pat Ng, Cristina Garcia, and others. Assignments include one short paper, a midterm, a final paper, and a number of short in-class writings.

ENGL 252 Sophomore Seminar: Late Twentieth-Century Women Writers and Visual Culture (also VISST 252) (IV)  
Spring. 4 credits. Limited to 15 students. S. Samuels. Women writers and artists in late twentieth-century America present nationalism through their bodies. In doing so, they can be extremely graphic. In addition to looking at food and sexuality in visual representations, we read selections from literary sources. Authors include Jessica Hagedorn, Oonya Kempadoo, Jamaica Kincaid, and Edwidge Danticat. Artists include Renée Cox, Mary Kelley, and Shirin Neshat.

This is a special seminar sponsored by the John S. Knight Institutes Sophomore Seminars Program Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the disciplines outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

[ENGL 255 African Literature # (IV) (LA)]  

[ENGL 260 Introduction to American Indian Literatures in the United States (also AM ST 260) (IV) (LA)]  

[ENGL 262 Asian American Literature (also AAS 262 and AM ST 262) (IV) (LA)]  
ENGL 274 Scottish Literature and Culture # (IV) (LA)
Spring. 4 or 6 credits. The course may be taken for 3 or 4 credits; those taking it for 4 credits will complete an additional writing project. If taken for four credits, it counts toward the English major, but not toward the minor. This course may be used as one of the three pre-1800 courses required of English majors. T. Hill and H. Shaw.

Scotland was an independent kingdom during most of its history. Although it is now politically united with England, it preserves a cultural distinctiveness. This course provides an introduction to Scottish literature and its cultural context. We focus on important Scottish literary works, with a special emphasis on the medieval period and the eighteenth through the twentieth centuries. The course should appeal to those who wish to learn more about their Scottish heritage, to those who wish to view in a new perspective works normally considered monuments of "English" literature, and to those who simply wish to know more about a remarkable culture and the literature it produced. Some of the texts will be read in translation, but no familiarity with Scots or earlier English is presumed. Authors studied include Henryson, Dunbar, Anonymous (the Scottish Ballads), Burns, Scott, Stevenson, Grassic Gibbon, Spark, and several recent century writers of short stories. Students view the film The Prime of Miss Jean Brodie.

ENGL 276 Desire (also COM L 276, FGSS 276, THETR 278) (IV) (LA)
Spring. 4 credits. E. Hanson.

Sexual desire is a series of scripted performances, a set of stories we tell ourselves about ourselves. Through a critical discussion of "those pleasures which we lightly call physical," to borrow a phrase from the French novelist Colette, we might discover a deeper appreciation for the strange narrative form of one's own desire, and perhaps even the strange narrative of our own. We begin with the theory that desire has a history, even a literary history, and we examine classic texts in some of its most influential forms: Christian, romantic, decadent, psychoanalytic, feminist, and queer. This course is an introductory survey of European dramatic texts from Plato and Aristophanes to Jean Genet and Caryl Churchill, and it is also a survey of the most influential trends in modern sexual theory and sexual politics, including the work of Freud, Foucault, Barthes, and various feminists and queer theorists. Topics for discussion include Greek pederasty, sublimation, hysteria, sadomasochism, homosexuality, pornography, cybersex, feminism, and other literary and performative pleasures, and the focus is always on expanding our critical vocabulary for considering sexual desire as a field of intellectual inquiry.

[ENGL 293 Survey in African American Literature (also AM ST 293) (IV) (LA)] Fall. 4 credits. The course is designed for majors, but will be open to all interested students. Next offered 2005-2006. H. Spillers.]

Special Topics

[ENGL 210 Medieval Romance: Voyage to the Otherworld # (IV) (LA)]
Spring. 3 credits. Next offered 2005-2006. T. Hill.]

[ENGL 235 Rewriting the Classics: Stories of Travels and Encounters (also FGSS 235) (IV) (CA)]
Fall. 4 credits. Next offered 2005-2006. E. DeLoughrey.]

ENGL 263 Studies in Film Analysis: Monsters and Misfits: Hanyuwd's Misogynist Myths of Women (also FGSS 263 and FILM 264) (IV) (LA)
Spring. 4 credits. Students enrolling in this seminar must be free to view films late afternoons on Mondays and Tuesdays. A "lab fee" of $25 will be charged. Permission of the instructor required. L. Bogel.

Exploring a series of (mostly) Hollywood films, we consider the cultural, political, sexual, and psychological implications of conservative myths that demonize women in film. Mainstream misfits and monstrous mothers, love-lorn goddesses and racializing sufragettes, language-lacking loners and marriage-mangling marauders, vampires and aliens: all film genres make room to exclude misfits, co-opt them back into the circle, or define community norms in opposition to them. We view, discuss, and read about such films as The Piano Teacher, The Hand that Rocks the Cradle, Psycho, The Manchurian Candidate (two versions), Safe, The Piano, Far From Heaven, The Searchers, Alien, Gilda, Fatal Attraction, Witness (two versions), The Haunting, Carrie, Boys Don't Cry, and The Bitter Tears of Petra von Kant.

ENGL 268 Culture and Politics of the 1960s (also AM ST 268) (IV) (CA)
Spring. 4 credits. P. Sawyer.

For many people, the sixties were a time of revolutionary hopefulness, when the civil rights movement, the Cold War, and the Vietnam War stimulated impassioned critiques and alternative experiments in living that changed American society forever. What can the experiences of young "boomers" and others, who lived through that famously turbulent decade, teach a later generation living through similar times of social crisis and war? This course tries to answer that question and others by combining a political overview with the close reading of texts. The main topics are racial justice, the Vietnam War, the counterculture, the New Left, the women's movement, and the movement for gay and lesbian rights. Texts include The Autobiography of Malcolm X, Dispatches, Slaughterhouse-Five, the poems of Ginsberg and Rich, speeches of King, films, manifestos, and music.

ENGL 292 Introduction to Visual Studies (also VISST 200) (IV) (LA)
Spring. 4 credits. T. Murray. For description, see VISST 200.

Courses for Sophomores, Juniors, and Seniors

Courses at the 300 level are open to sophomores, juniors, and seniors and to others with the permission of the instructor.

ENGL 302 Literature and Theory (also COM L 302/622, and ENGL 602) (IV) (LA)
Fall. 4 credits. No previous knowledge of literary theory is assumed. 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.

ENGL 308 Icelandic Family Sagas # (IV) (LA)
Spring. 4 credits. T. Hill.

An introduction to Old Norse-Icelandic mythology and the Icelandic family saga—the "native" heroic literary genre of Iceland. Texts vary but normally include the Prose Edda, the Poetic Edda, Hrafnkels Saga, Njals Saga, Laxdaela Saga, and Grettirs Saga. All readings are in translation.

[ENGL 310 Old English in Translation # (IV) (LA)]
Fall. 4 credits. Next offered 2005-2006. T. Hill.

[ENGL 311 Old English (also ENGL 611) # (IV) (LA)]
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. A. Galloway.

This course is intended as an introduction for graduate and undergraduate students to the Old English language; graduate students may also opt to use it for more advanced work. We begin with simple prose texts and proceed to poetic texts such as Malton, The Wanderer, The Seafarer, The Dream of the Rood, and selections from Beowulf. The course addresses language and literature as a pairing. There are regular translations and discussions, a midterm exam, a short paper, and a final exam.

[ENGL 312 Beowulf (also ENGL 612) # (IV) (LA)]
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. T. Hill.

A close reading of Beowulf: Attention is given to relevant archaeologicial, literary, cultural, and linguistic issues. One semester's study of Old English, or the equivalent, is recommended.

ENGL 315 The Crusade Romances and the Project of Empire
Spring. 4 credits. S. Yeager.

This course may be used as one of the three pre-1800 courses required of English majors. In 1095, Pope Urban II introduced a new way for western medieval Christians to earn salvation: as crusaders they could join a campaign designed to capture the Holy Land. In a project that brought together greatest minds and resources of the western world, the crusading movements inspired subsequent generations of English and western European poets to create some of the most beautiful and, at times, most brutal romances ever written. This course will focus on a range of romance traditions, including the Arthurian romance, legends of Charlemagne and Roland, as well as other famous kings such as Richard I. Other romances will introduce us to crusading activities in Spain, the Baltic, as well as in the Middle East. We will be especially concerned with the ways in which military campaigns and the rhetoric of crusade and conversion came to influence the romance genre. This course is designed to contextualize
the crusade within the medieval literary world as we read and discuss those romances, which fuse the chivalric Christian mode with a specific set of concerns: salvation, conquest, and conversion.

ENGL 319 Chaucer # (IV) (LA)
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. Parker. Readings from early 1790s to early 1820s—among them Blake, Wordsworth, Wallis, Coleridge, Byron, Hazlitt, Mary Shelley, Percy Shelley, and Keats—with major emphasis on poetry but with substantial attention to prose fiction, drama, letters, and political and literary essays. The course is concerned with close reading of formal experiments in narrative, lyric, and dramatic representation and with an analysis of political and cultural issues and contexts in an age of national reform and international revolution and conflict.

ENGL 340 English Romantic Period # (IV) (LA)
Fall. 4 credits. This course may not be used as one of the pre-1800 courses required of English majors. MacDonald. Readings from early 1790s to early 1820s—among them Blake, Wordsworth, Wallis, Coleridge, Byron, Hazlitt, Mary Shelley, Percy Shelley, and Keats—with major emphasis on poetry but with substantial attention to prose fiction, drama, letters, and political and literary essays. The course is concerned with close reading of formal experiments in narrative, lyric, and dramatic representation and with an analysis of political and cultural issues and contexts in an age of national reform and international revolution and conflict.

ENGL 341 American Film Melodrama (also COM L 344) (IV) (LA)
Spring. 4 credits. S. Haenni. For description, see FILM 344.

ENGL 345 Victorian Controversies # (IV) (LA)
Fall. 4 credits. Classes by lecture and discussion. S. Siegel. This course considers the controversies that divided public opinion in England and Ireland. It explores the social problems critics and artists identified, the various solutions they proposed, and their contrasting visions of their nation and its rebellious colonies. The first weeks will consider the current events that colored opinion on both sides of the Irish Sea: one, the Great Exhibition of Science and Industry of 1851, was celebratory; the other, the Great Irish Famine, was catastrophic. The remaining weeks are devoted to the urgent questions that men and women in England and Ireland asked about themselves and their time: Was their century marked by progress or by decline? Would machines destroy or ennoble workers? Did aesthetic experience complement or compete with religious doctrine? Were art and science dependent upon or opposed to each other? Should all forms of expression be permitted, or should certain kinds be censored? Should the colonies be permitted to rule themselves or remain dependent on England? Would prestige be gained if institutions of higher learning awarded degrees to women? Was "manliness" revealed through "character" or through "behavior"? Authors will include Arnold, Barrett Browning, Carlyle, Gregory, Hyde, Joyce, Mill, Morris, Parnell, Pater, Ruskin, Wilde, and Yeats. Classes by lecture and discussion.

Fall. 4 credits. F. DeLoughrey. In this course we develop a critical vocabulary and range of methodologies for discussing the relationship between literature, gender, and the environment. We examine topics such as the cultural construction of nature, the poetics and politics of representing the environment, and the relationship between power and place. We complicate the association of women with nature by highlighting the ways in which women also produce culture, and we also consider what role literature might have in shaping the language of global environmental movements. Our discussions place ecofeminism in a dialogue with postcolonial literary texts from Africa, South Asia, the Pacific, and the Americas. Authors may include Alvarez, Cervi, Emechea, Garcia, and others. Requirements include two papers, an oral presentation, and active class participation.

ENGL 349 Shakespeare and Europe (also COM L 348) (IV) (LA)
Fall. 4 credits. This course may NOT be used as one of the three pre-1800 courses required of English majors. Kennedy. For full course description, see COM L 348.

ENGL 350 The Modern Tradition It: 1890-1940 (IV) (LA)
Fall. 4 credits. D. Schwarz. Critical study of major works by Hardy, Conrad, Lawrence, Joyce, Woolf, Eliot, Yeats, Hopkins, Wilde, Wallace Stevens, and others. While the emphasis is on close reading of individual works, lecture and discussion place the authors and their works within the context of literary, political, and intellectual history. The course seeks to define the development of literary modernism (mostly but not exclusively in England) and relate literary modernism in England to that in Europe and America as well as to other intellectual developments. Course focuses on the relationship between modern literature and modern painting and sculpture; on occasion, slides are viewed.

ENGL 353 The Modern Indian Novel # (IV) (LA)
Spring. 4 credits. S. Mohanty. A survey of the modern Indian novel, from its origins in the latter part of the nineteenth century to the present. At one extreme, one is made to read the novels as responses to colonialism and to the challenges of a postcolonial society. Texts (mainly novels, but also a few short stories) are drawn from Indian languages as well as English, including works by such authors as U. R. Ananthamurthy, Rabindranath Tagore, Salman Rushdie, Gopinath Mohanty, Anita Desai, Fakir Mohan Senapaty, Ambai, Prem Chand, Arundhati Roy, and R. K. Narayan. Two papers (five to six and twelve to fourteen pages) and a journal are required.

ENGL 354 British Modernist Novel (IV) (LA)
Spring. 4 credits. M. Hite. Virginia Woolf observed, "in or about December, 1910, human character changed." In her "tongue-in-cheek" statement, the early twentieth century inaugurated a very different understanding of character, and a consequent shift in the emphasis of the novel. The class reads novels by Woolf, E. M. Forster, D. H. Lawrence, Ford Madox Ford, Jean Rhys, and Rebecca West, along with critical and theoretical writings by these novelists. Writing requirements include a weekly post to the class e-list and two to twelve page papers.

ENGL 355 Decadence (also COM L 355 and FGSS 385) (IV) (LA)
Fall. 4 credits. F. Hanson. "My existence is a scandal," Oscar Wilde once wrote, summing up in an epigram the effect of his carefully cultivated style of perversity and paradox. Through their valorization of aestheticism and all that was considered artificial, unnatural, or perverse, the so-called "decadent" writers of the late-nineteenth century sought to free the pleasures of beauty, spirituality, and sexual desire from...
here their more conventional ethical moorings. We discuss the most important texts through which "decadence" was defined as a visual and literary style, including works by Charles Baudelaire, Stéphane Mallarmé, Leopold von Sacher-Masoch, A. C. Swinburne, Walter Pater, Renée Veyrin, James MacNeil Whistler, and Aubrey Beardsley, with a particular focus on Oscar Wilde. Topics for discussion include aesthetics and the cult of "art for art's sake," theories of cultural and linguistic degeneration, homophobia and sexual encoding, androgyny, sexual inversion, hysteria, masochism, mysticism, sublimation, Cartholism, belief, and dandyism. Students may read French and German texts in the original or in translation.


**ENGL 361 Studies in the Formation of U.S. Literature: Emerson to Melville (also AM ST 361) # (IV) (LA)** Spring. 4 credits. D. Fried.

A survey of literary culture in New England and elsewhere in the mid-nineteenth century. Focus is on close analysis of individual works within the context of literary and cultural history. We sample a range of genres and modes of writing from the period, including romance, story, lecture, essay, journal, familiar letter, poetry prophetic and lyric, romance, sermon, lecture, essay, journal, familiar letter, poetry prophetic and lyric, novella, and slave narrative. We read some of the major texts of Transcendentalism and consider the influence of that movement, particularly through Emerson. We examine the interactions not centered around Emerson. Emphasis, however, is less on locating large-scale cultural and ideological movements within these writings than on examining how they engage the reader, how they unfold rhetorically, and how their particular designs inflect their genre. Along the way we look at the passion for social reform in the 1840s and 50s, the rise of the women's movement, the impact of Southern slavery on New England sensibilities, literary responses to the Civil War, the various uses of the first-person narratives, the force of religious faith and doubt in shaping ideas about the individual, and the interaction among many of these writers known personally to each other. Readings include Emerson's "Nature" and "Self-Reliance"; Hawthorne's fiction; Thoreau's "Walden"; Margaret Fuller's Woman in the Nineteenth Century; slave narratives by Douglass and Jacobs; selections from Whitman's Leaves of Grass; Dickinson's poetry and letters, and poetry, essays, and fiction by Melville. Lectures and short discussion sections.


**ENGL 363 American Fiction at the Turn of the Twentieth Century (also AM ST 363) (IV) (LA)** Spring. 4 credits. Next offered 2005-2006. K. McCullough.

**ENGL 364 American Literature Between the Wars (also AM ST 364) (IV) (LA)** 4 credits. Next offered 2005-2006.

**ENGL 365 American Literature Since 1945 (also AM ST 365) (IV) (LA)** Fall. 4 credits. Next offered 2005-2006. B. Maxwell.


Reading and discussion of the most fascinating novelists in the nineteenth-century United States, we examine patterns of social and political awareness in these writers. In particular, we think about the relations among stylistic concerns in fiction and the construction of identities formed by national, racial, gendered, and sexual allegiances. Writers may include Mark Twain, Charles Chesnutt, Nathaniel Hawthorne, Henry James, Edith Wharton, David Levinsky, Harriet Wilson, Herman Melville, E. D. E. N. Southworth, and Stephen Crane.

**ENGL 367 Studies in U.S. Fiction After 1900: Contemporary American Indian Fiction of the United States** Fall. 4 credits. E. Cheyfitz.

This course reads a selection of contemporary U.S. American Indian fiction from both established and emerging writers. The focus of the course is the (post)colonial situation of Native communities in the U.S., a situation created by the unique and contradictory position of U.S. American Indian tribes as at- once sovereign nations, U.S. dependencies, and—from the standpoint of U.S. citizenship—communities fully integrated in the U.S.A. The writers we read include Leslie Marmon Silko, Gerald Visnenor, James Welch, Linda Hogan, Diane Glancy, Adam Louis, Thomas King, Gordon Henry Jr., Debra Magpie Earling, Anna Lee Walters, Charles H. Red Corn, Craig Womack, Greg Sarris, Susan Power, Ray A. Young Bear, and Sherman Alexie.

**ENGL 368 American Novel Since 1950 (also AM ST 368) (IV) (LA)** Fall. 4 credits. Next offered 2005-2006. P. Sawyer.

**ENGL 369 Fast-Talking Dames and Sad Ladies (also FILM 367 and FGSS 369) (IV) (LA)** Fall. 4 credits. Students must be free to attend Monday and/or Tuesday late-afternoon screenings. $20 film fee. Enrollment limited to 15. Permission of instructor L. Bogel.

In this seminar focusing on sexy or subdued heroines of Hollywood's 1940s and current films, we work to define romantic comedy and melodrama as genres, vehicles for female stars, and ways of viewing the world. Psychoanalytic and feminist analyses of these films help us pose questions about gender and culture, about gendered spectatorship, about the relation of these films to American culture, about Hollywood's changing constructions of "woman," the "material."..."Mme. "feminine," and about representations of desire, pleasure, fantasy, and ideology. Required weekly screenings of such films as Gilda, The Lady Eve, Reckless Moment, Notorious, The Women, The Philadelphia Story, His Girl Friday, Mrs. Dalloway, The Hours, First Wives Club, All About My Mother, Silence of the Lambs, Far From Heaven, and The Deep End.

**ENGL 370 The Victorian Novel # (IV) (LA)** Spring. 4 credits. P. Sawyer.

In the nineteenth century, British novelists produced some of the most complex representations of human society and historical change ever attempted in fiction. They also developed or drew upon a variety of narrative techniques: free indirect discourse, multiplicit structure, symbolic organization, multiple narrators, and "found" documents. In addition to introducing students to specific texts and authors, this course will concern ways of reading fiction in general. Topics include representations of community and class, the modern city, the supernatural, and the construction of male and female identity. Likely readings: Austen, Emma; Scott, "The Two Drovers"; Emily Bronte, Wuthering Heights; Dickens, Little Dorrit; Stevenson, Dr. Jekyll and Mr. Hyde, and Eliot, Middlemarch.

**ENGL 372 Medieval and Renaissance Drama # (IV) (LA)** Fall. 4 credits. This course may be used as one of three pre-1800 courses required of English majors. S. Yesegger.

After the collapse of Rome, western European drama was re-created from a combination of sources: formal debate, popular festival, civic celebration, and, especially, religious liturgy. By the seventeenth century it had grown in England to be one of the most polished forms of English literary art (but also at this stage of the sleaziest). This long span of drama history allows us to consider drama's origins and changing cultural meanings. Using selected highlights, this course traces the residue of Roman drama and the development of European and English drama from the tenth to the thirteenth centuries; then examines more fully some of the richness of late medieval drama in English; then finally reads some of the writers in the age of authorship and London dominance—usually known as the Age of Shakespeare, although Shakespeare appears there as only one part among others, including Marlowe, Kyd, Jonson, Middleton, and Marston. The course format is lecture and discussion, and lecturers and discussion leaders are occasionally drawn from graduate students pursuing the course—and possibly also from undergraduate students who endeavor to present the staging and style of some of the works we consider.

**ENGL 373 English Drama from 1700 to the Present # (IV) (LA)** Spring. 4 credits. S. McMillin.

The modern side of English drama, from the Restoration to contemporary plays. Writers include Behn, Congreve, Dryden, Tate, Sheridan, Shelley, Robertson, Shaw, and Churchill.

**ENGL 374 Slavery in Twentieth-Century American Film and Fiction (also AM ST 374) (IV) (LA)** Fall. 4 credits. Next offered 2005-2006. N. Walgora-Davis.

**ENGL 375 Studies in Drama and Theatre: Modernism and Metatheatre** Spring. 4 credits. P. Ring.

This course addresses central issues in the study of theatre through the lens of the modern metatheatre. Through a reading of dialogues about the theatre and theoretical texts, as well as dramatic works, we investigate the theatre's response to the anti-theatrical prejudice; the theory and critique of acting and actors; the question of mimeticism; and the relation between the literary text and the stage. Readings include Pinter, Aristophanes, Craig, Stanislavski, and Artaud; plays by Beckett, O'Neill, Wilde, Churchill, Pirandello, Stein, and others.
of Japanese Americans, and carceral and punitive operations of the Immigration and Naturalization Services (now part of the Department of Homeland Security).

**ENGL 398 Cultural Practices**
- **Latina/o Cultural Practices (also LSP 398)** (IV) (CA)
- **Spring. 4 credits. R. Gilbert.**

Courses for Advanced Undergraduates

Courses at the 400 level are open to juniors and seniors and to others by permission of instructor unless other prerequisites are noted.

**ENGL 402 Literature as Moral Inquiry**
- **(IV) (KCM)**
- **Fall. 4 credits. S. Mohanty.**

What can literary works, especially novels and short stories, 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*? Do they deal with the same range of issues? 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 read selections from key texts in moral philosophy, including works by Aristotle, Kant, Marx, and Nietzsche. Our attempt is to use these works to help us understand the nature of moral debate and inquiry in novels like Elton’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 most probably read include Nadine Gordimer, Doris Lessing, and Kazuo Ishiguro. The emphasis is on close reading, with particular attention to the relationship between formal elements (such as the use of narrative techniques) and the moral questions the texts organize and explore. Assignments include two papers and a journal.

**ENGL 403 Studies in American Poetry**
- **A. R. Ammons (also AM ST 403)** (IV) (CA)
- **Spring. 4 credits. Next offered 2005–2006. R. Gilbert.**

**ENGL 404 Paleography, Bibliography, and Reception History**
- **Also ENGL 604** (IV) (LA)
- **Spring. 4 credits. Next offered 2005-2006. A. Galloway.**

**ENGL 405 The Politics of Contemporary Criticism**
- **(IV) (LA)**
- **Fall. 4 credits. Next offered 2005–2006. S. Mohanty.**

**ENGL 409 Ovid’s Metamorphoses**
- **Also COM L 447 and S HUM 404**
- **Fall. 4 credits. J. Ortiz.**

**ENGL 413 Middle English**
- **Also ENGL 410** (IV) (LA)
- **Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. Next offered 2005–2006.**

**ENGL 414 Bodies of the Middle Ages: Embodiment, Incarnation**
- **Performance # (IV) (LA)**
- **Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. Next offered 2005–2006. M. Raskolnikov.**

**ENGL 416 Chaucer and the Politics of Love**
- **(IV) (LA)**
- **Spring. 4 credits. Next offered 2005–2006. W. Wetherbee.**

**ENGL 420 Renaissance Humanism**
- **Also COM L 452, COM L 652, and ENGL 642** (IV) (LA)
- **Spring. 4 credits. W. Kennedy.**

**ENGL 422 Close Reading and Critical Debate**
- **(IV) (LA)**
- **Spring. 4 credits. Next offered 2005–2006. F. Bogel.**

**ENGL 429 Adam's Rib and Other Divine Signs: Reading Biblical Narrative**
- **Also RELST 429** (IV) (LA)
- **Spring. 4 credits. Next offered 2005–2006. L. Donaldson.**

**ENGL 433 Electronic Innovations**
- **Also VISST 433** (IV) (CA)
- **Fall. 4 credits. Requirements: two medium-length papers (7–8 pages), collaborative online project (with students in Australia), seminar presentation. Some advanced knowledge of digital or installation art is helpful. Permission of instructor. Next offered 2005–2006. T. Murray.**

**ENGL 434 Electronic Art and Culture**
- **(IV) (LA)**
- **Spring. 4 credits. Next offered 2005–2006. T. Murray.**

**ENGL 437 Fiction(s) of Race, Fact(s) of Racism: Perspectives from South African and Afro-American Literatures**
- **Also ENGL 644 and COM L 645** (IV) (LA)
- **Spring. 4 credits. B. Levitt.**

**ENGL 442 Rousseau and Rhetorical Reading**
- **Also COM L 444 and COM L 645** (IV) (LA)
- **Spring. 4 credits. C. Chase.**

**ENGL 443 The Dandy in London and Dublin**
- **(IV) (LA)**
- **Spring. 4 credits. Next offered 2005–2006. S. Siegel.**

**ENGL 446 Text Analysis for Production: How to Get from the Text onto the Stage**
- **Also THETR 445 and VISST 445** (IV) (LA)
- **Spring. 4 credits. B. Levitt.**

**ENGL 445 Shakespeare in (Con)Text**
- **Also THETR 446 and VISST 446** (IV) (LA)
- **Fall. 4 credits. B. Levitt.**

**ENGL 450 History of the Book**
- **(IV) (LA)**
ENGL 452 Wilde and Woolf (IV) (LA)
Spring. 4 credits. S. Siegel.
This seminar considers the question of style: what does the word mean? why has it claimed attention; how has it behaved in the work of two authors whose writings among their contemporaries marked distinctive departures? We explore Oscar Wilde and Virginia Woolf as readers of literary and social texts. Along the way, we direct our attention to the implicit expectations we bring to our understanding of "Victorians" and "Modernists." Selections are drawn from the full range of Wilde's and Woolf's work. Our principal texts, however, are limited to a few essays by each author.

ENGL 453 Twentieth-Century Women Writers of Color (also AAS 253, FGSS 453) (IV) (LA)
Fall. 4 credits. Course requirements include class presentations, short responses to the readings, and a longer research essay. Next offered 2005-2006. S. Wong.

ENGL 454 American Musical Theatre (also MUSIC 490 and THETR 454) (IV) (LA)
Fall. 4 credits. Prerequisite: ENGL 272 or THETR 240-241 plus ability to read and analyze music at the level of MUSIC 105. Students enrolled in MUSIC 105 would be eligible. Limited to 15 students. S. McMillin.

ENGL 456 Postmodern Novel (also ENGL 656) (IV) (LA)

ENGL 458 Imagining the Holocaust (also JWST 458 and 658, COM L 483 and 683) (IV) (LA)
Spring. 4 credits. D. Schwarz.
What is the role of the literary imagination in keeping the memory of the Holocaust alive for our culture? We examine major and widely read Holocaust narratives that have shaped the way we understand and respond to the Holocaust. As we move further away from the original events, why do the kinds of narratives with which authors render the Holocaust horror evolve to include fantasy and parody? Employing both a chronological overview and a synchronic one, this course sketches out the ways in which gender, nation, and class inform "travelling theory." We read Chicanas and mexicana racial and gender consciousness has emerged as activists, artists, scholars, writers, and intellectuals have worked to forge new visions of feminisms from early twentieth-century organizing through current transnational initiatives. We pay particular attention to the significant impact of African American and Latina(o) American feminist theories and histories on Chicana feminist discourse and critical discourse. We also look at the significant role postcolonial feminist work has played in recent Chicana feminist discussions of globalization and transnational feminist practices.

ENGL 465 American Violence
Fall. 4 credits. S. Saavedra.
We will read late eighteenth- and early nineteenth-century American literature and examine how it represents the violence of the American Revolution, conflicts over slavery and the frontier, and the position of women. Novels read may include Charles Brockden Brown's Eden Huntly, James Fenimore Cooper's Last of the Mohicans, Harriet Wilson's Our Nig, Catherine Sedgwick's Hope Leslie, George Lippard's Blanche of the Brandymills, and Robert Montgomery Bird's Nick of the Woods. Other readings will include political orations, slave narratives, and historical accounts, as well as critical readings on nationalism, sexuality, and violence. Throughout, we will ask how different styles of embodiment and violent disembodiment are associated with the American project.

ENGL 466 James on Film (IV) (LA)

ENGL 468 Baldwin, Brooks, and Baraka (IV) (LA)

ENGL 469 Faulkner (also AM ST 469) (IV) (LA)
Fall. 4 credits. Next offered 2005-2006. M. Hite.

ENGL 470 Studies in the Novel (IV) (LA)

ENGL 471 Humor in Literature (IV) (LA)
Fall. 4 credits. A. Lure.
Why do we laugh, and at what? Why do some works seem funny at certain periods and in certain social contexts? This course looks at different ways of answering these questions, and at different kinds of literary humor: romantic comedy, black comedy, farce, satire, parody, and nonsense. Among works that may be read are humorous folktales, comic verse, A Midsummer Night's Dream, and The Way of the World, Gulliver's Travels, Alice in Wonderland, The Importance of Being Earnest, Patience, Waiting for Godot, and stories by James Thurber, Flannery O'Connor, Grace Paley, Philip Roth, Donald Bartheleme, and Garrison Keillor.

ENGL 473 Sondheim and Musical Theatre (also MUSIC 495 and THETR 472) (IV) (LA)
Fall. 4 credits. Prerequisite: ENGL 454, American Musical Theatre (also listed as THETR 454 and MUSIC 490), or similar background. Students must be able to read music and must be familiar with dramatic literature as a genre. Also open to graduate students who have a special reason to study Sondheim. Limited to 15 students. S. McMillin.

A seminar on the plays, lyrics, and music of Stephen Sondheim. The course takes up all of Sondheim's major works, with particular attention to Company, A Little Night Music, The Frogs, Pacific Overtures, Sweeney Todd, Sunday in the Park with George, and Into the Woods. Collateral assignments in Aristophanes, Rodgues and Hammerstein, Bergman's film Smiles of a Summer Night, Chekhov, Shaw, Shakespeare, Kabuki theatre, Victorian melodrama, and other topics that are at the basis of Sondheim's musicals. There is a focus on the formal differences between musical theatre and what is often called "legitimate" theatre.

ENGL 474 Senior Seminar on Major Authors: Hemingway, Fitzgerald, and Faulkner
Spring. 4 credits. D. McCall.
Hemingway, Fitzgerald, and Faulkner: the major texts.

ENGL 476 Global Women's Literature (IV) (LA)
Spring. 4 credits. E. Deloughrey.
This course focuses on contemporary women's writing in English from "postcolonial" regions such as the Pacific, Caribbean, India and Africa. During the semester we look at how women from these regions depict the process of migration from within the nation (from rural to urban spaces) or from the "postcolony" to metropolises such as England. As women are generally associated with private, domestic space, this course explores the motifs of exile and border-crossing and sketch out the ways in which gender, nation, and class inform "traveling theory." We read novels/poetry by Joan Riley, Merle Hodge, Patricia Grace, Miriamanto, S. Desai, and Grace Nichols, and align these texts with the theoretical works of James Clifford, Caren Kaplan, Paul Gilroy, and M. NourbeSe Philip. Requirements: active class participation, student presentations, a few short essays, and a final paper.

ENGL 477 Melville
Fall. 4 credits. B. Maxwell.
An American whose life and writing ranged over the globe, Herman Melville "saw the tendency of things." Our study of the fiction and poetry turns on some of those "things" of modernity that most obsessively engaged Melville's representational and critical capacities: slavery, illegitimate 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 test the premise that Melville charted the fault lines of his resort to religion. We will test the premise of male comradeship, and the ambivalent occultation of women, the shifting terrain Works read will include Typee, Redburn, White-Jacket, Moby Dick, Pierre, The Confidence-Man, short stories, poems, and sections of the book-length poem Clarel.

ENGL 478 Intersections in Lesbian Fiction (also AM ST 478 and FGSS 477 )

Spring. 4 credits. K. McCullough.
For description, see FGSS 477.

ENGL 480-481 Seminar in Writing (IV) (LA)

Fall, 480; spring 481. 4 credits.
For description, see section "Creative Writing."


ENGL 486 American Indian Women's Literature (also AIS 486) (IV) (LA)

Spring. 4 credits. L. Donaldson.
This course surveys the origins and issues pertinent to the development of women's literatures in a number of different American Indian cultures. It considers traditional modes of expression such as women's songmaking, weaving, basketmaking and storytelling as well as the influence and appropriation of European literary forms such as the novel.
The course is loosely chronological, although we spend the first part of the semester attending to Native paradigms of cultural production. We read a diverse range of materials, including novels, autobiography, poetry, and short stories. By the end of the course, students should be able to identify and articulate not only the pressing historical and literary/cultural issues pertaining to American Indian women's writing but also the major figures of this field. Students have the opportunity to read one work of their own choosing. Course texts include Betty Louise Bell (Cherokee), Faces in the Moon; Louise Edrich (Chippewa), Tracks; Luci Tapahonso (Navajo), Saninii Databaal / The Women Are Singing: Poems and Stories; Linda Hogan (Chickasaw), Solar Storms; Mourning Dove (Salish), Cogauwa: The HalfBlood; Wendy Rose (Hop/Miwok), Bone Dance: Selected Poems; Leslie Marmon Silko (Laguna Pueblo), Yellow Woman (ed. Melody Graulich); Elizabeth Woody (Yakama/Warm Springs), Seven Hands, Seven Hearts: Prose and Poetry, and Joy Harjo (Muscogee), The Woman Who Fell from the Sky.

ENGL 487 Writing About Literature (IV) (LA)

Fall. 4 credits. Next offered 2005-2006. F. Bogel.

ENGL 490 Literatures of the Archipelagoes: Caribbean and Pacific "Tidalities" @ (IV) (LA)


ENGL 491 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 U.S. Fiction—K. McCullough.
This seminar investigates the narrative uses of history and memory in U.S. fiction, 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 of 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, Lan Cao, Michelle Cliff, Cristina Garcia, Jewelle Gomez, Harriet Jacobs, Gayl Jones, Maxine Hong Kingston, Lydia Kwa, Achy Obejas, and Danzy Senna.

Sec 2: Postmodernist Fiction—M. Hite.
This class explores experimental (i.e., weird, counterreal) "postmodern" fiction written in the post-World War II period by some (but not all) of the following writers: Kathy Acker, Margaret Atwood, John Barth, Jorge Luis Borges, Angela Carter, Robert Coover, Don De Lillo, Vladimir Nabokov, Thomas Pynchon, Ishmael Reed, and Joanna Russ. We also read some criticism and theory dealing with the period, condition, or movement described as "postmodern." Requirements include seminar presentations, weekly online e-list posts, and two critical papers.

ENGL 492 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 Joyce's Ulysses—D. Schwarz.
A thorough episode-by-episode study of the art and meaning of Joyce's Ulysses. We explore how Ulysses redefines the concepts of epic and hero and how Joyce's masterwork reflects literary modernism. We discuss how Ulysses raises major issues about the city, colonialism, and popular culture, and dramatizes what it means for the central character to be a Jew and an outsider in Dublin. We address Ulysses as a political novel—specifically, Joyce's response to Yeats and the Celtic Revival. Joyce's role in the debate about the direction of Irish politics after Parnell, and Joyce's response to British colonial occupation of Ireland. We also investigate the relationship between Ulysses and the other experiments in modernism, especially painting and sculpture.

We also examine Ulysses in the context of major issues in literary study and test various critical and scholarly approaches. Such a self-conscious inquiry into theories and methods should help prepare students to confront other complex texts, as well as help them define their own critical positions as they plan their senior honors theses. No previous experience with Joyce is required.

Sec 2 Shakespeare and Marlowe—B. Correll.
This course brings together two of the most striking and powerful writers of the early modern period. Their work in drama and in verse gains admiration and provokes questions and thoughts not only about their sensational lives and their historical relationship but also about the intriguing issues they raise about power, gender, and the human subject. The texts for the course will include The Jew of Malta, The Merchant of Venice, Othello, and Cleopatra, Tamburlaine I and II, Edward II, Henry V, Hero and Leander, Venus and Adonis, as well as some lyric poetry. For students who are familiar with some of the work of Shakespeare, the goal of this course is to establish a larger cultural and literary context for close study of both writers and their critical reception.

ENGL 493 Honors Essay Tutorial I

Fall or spring. 4 credits. Prerequisites: senior standing and permission of director of the Honors Program.

ENGL 494 Honors Essay Tutorial II

Fall or spring. 4 credits. Prerequisites: ENGL 493 and permission of director of the Honors Program.

ENGL 495 Independent Study

Fall or spring. 2-4 credits. Prerequisites: permission of departmental adviser and director of undergraduate studies.

Courses Primarily for Graduate Students

Permission of the instructor is a prerequisite for admission to courses numbered in the 600s. These are intended primarily for graduate students, although qualified undergraduates are sometimes admitted. Undergraduates seeking admission to a 600-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 term.

Graduate English Courses for 2004-2005

Fall
ENGL 600 Colloquium for Entering Students
J. Adams.
ENGL 602 Literature and Theory (also COM L 302, COM L 622, and ENGL 302)
J. Culler.
For description, see ENGL 302.
ENGL 605 Latin Allegory and Vernacular Authority in the Late Middle Ages
M. Raskolnikov and W. Wetherbee.
ENGL 611 Old English (also ENGL 311)
A. Galloway.
For description, see ENGL 311.
ENGL 617 Linguistic Structure of Old English (also LING 649)
W. Harbert.
For description, see LING 649.
ENGL 627 Shakespeare: The Greek and Roman Plays
B. Correll.
ENGL 640 The 1790s
R. Parker.
ENGL 641 Poetry and Poetics of Translation (also COM L 439, COM L 643, GERST 439, ROM S 439, ROM S 639, and S NUM 439)
J. Monroe.
For description, see COM L 439.
ENGL 565 Aestheticsm (also COM L 655 and FGSS 655)
E. Hanson.

ENGL 670 Joyce's Ulysses
D. Schwarz.

ENGL 680 Defenses of Poetry
D. Fried.

ENGL 696 Digital Bodies, Virtual Identities (also ART H 575, COM L 692, THETR 633)
T. Murray.

ENGL 780.01 M.F.A. Seminar: Poetry
P. Janowitz.

ENGL 780.02 M.F.A. Seminar: Fiction
S. Vaughn.

ENGL 785 Reading for Writers: The Good, the Bad, and the Sometimes Ugly: Writers of Witness
K. McClure.

Spring

ENGL 612 Beowulf (also ENGL 312)
T. Hill.

ENGL 615 Piers Plowman and the Problem of Literary History
A. Gallaway.

ENGL 624 Renaissance Humanism (also COM L 452, COM L 652, and ENGL 420)
W. Kennedy.

For description, see COM L 452.

ENGL 654 Pollution, Plagiarism, Poetry
S. Siegel.

ENGL 665 The Nineteenth-Century American Novel
S. Samuels.

ENGL 668 Bloomsbury and British Modernism
M. Hite.

ENGL 671 Law and Literature
E. Cheyfitz.

ENGL 678 Modern Theatre and Mechanization
M. Puchner.

ENGL 688 Contemporary Poetry and Poetics (also COM L 674 and SPANL 674)
J. Monroe.

ENGL 690 Ethics, Aesthetics, and Literary Studies
S. Mohanty.

ENGL 692 Contemporary Formalist Criticism and the Study of Poetry
F. Bogel.

ENGL 694 Marxism and Postcolonial Discourse
B. Jeyifo.

ENGL 781.01 M.F.A. Seminar: Poetry
L. Szporluk.

ENGL 781.02 M.F.A. Seminar: Fiction
D. McCull.

ENGL 785 Reading for Writers: A Party of One: Eccentric Postmodern American Poetry
A. Fulton.

ENGLISH AS A SECOND LANGUAGE
See English for Academic Purposes.

ENGLISH FOR ACADEMIC PURPOSES
D. Campbell, director; S. Schaffzin, I. Arnensen, K. (Priscilla) Kershaw

Note: Courses and credits do not count toward the A.B. degree.

ENGL 205 English as a Second Language
Fall. 4 credits. Prerequisite: placement by examination. S. Schaffzin.
An all-skills course emphasizing listening and speaking, with some writing practice. Students also meet individually with the instructor.

ENGL 206 English as a Second Language
Spring. 3 credits. Prerequisite: ENGL 205 or placement by examination. S. Schaffzin.

ENGL 206 English as a Second Language
Fall or spring. 1 credit. Prerequisite: permission of instructor. S. Schaffzin.
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 210 English as a Second Language
Spring. 1 credit. Prerequisite: permission of instructor. S. Schaffzin.
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 211 English as a Second Language
Fall, spring, or summer. 3 credits. Prerequisite: placement by examination. D. Campbell.
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 212 English as a Second Language
Spring. 3 credits. Prerequisite: permission of instructor. Enrollment is restricted to 12 on a first-come, first-served basis. D. Campbell.
Research paper writing. For the major writing assignment of this course, the 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 (with 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 213 Written English for Non-Native Speakers
Spring. 3 credits. Prerequisite: permission of instructor. S. Schaffzin.
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 115-116 English for Later Bilinguals
For description, see first-year writing seminar brochure.

FALCON PROGRAM (INDONESIAN)
See Department of Asian Studies.

FEMINIST, GENDER, & SEXUALITY STUDIES

Introduction to the Program
The Feminist, Gender, & Sexuality Studies Program is an interdisciplinary program in the College of Arts and Sciences that seeks to deepen our understanding of how gender and sexuality are ubiquitously intertwined with structures of power and inequality. Central to the curriculum are the following overarching assumptions:

That definitions of sex, gender, and sexuality are neither universal nor immutable, but are instead social constructions that vary across time and place, serve political ends, and have ideological underpinnings.

That gender and sexuality are best understood when examined in relation to one another, in relation to the oppression of women and sexual minorities (e.g., lesbians, gays, bisexuals, transgendered and transsexual people), and in relation to other structures of privilege and oppression, especially racism and class exploitation; and that even...
the most current knowledge derived from the humanities, social sciences, and natural sciences is not as impartial, objective, or neutral as has traditionally been thought, but emerges instead out of particular historical and political contexts. A historical footnote: Established in 1972 as one of the byproducts of the Women’s Liberation Movement, the Cornell Feminist, Gender, & Sexuality Studies Program was initially called Women’s Studies so as to explicitly name the group rendered invisible by (what was then almost always referred to as) the “patrarchy”—and also so as to highlight that it would be speaking from the perspective of the traditionally marginalized, other rather than from the perspective of the group presumed by the dominant paradigm to neutrally represent humankind (i.e., men). But the name quickly became controversial, not only because it suggested that the objects of study, as well as those undertaking the studies, were exclusively women, but also because it did nothing to discourage the common assumption that the women in question were white, middle-class, and heterosexual. To expand and institutionalize the sexuality component of the Program, a minor in Lesbian, Bisexual, and Gay Studies was established at both the graduate and undergraduate levels in the early 1990s. To shift the emphasis of the program even further toward the intertwining of gender and sexuality with structures of power and inequality, in 2002 the program changed its name from Women’s Studies to Feminist, Gender, & Sexuality Studies.

Program Offerings

Feminist, Gender, & Sexuality Studies offers an undergraduate major, an undergraduate concentration, and a graduate minor. Undergraduate students in the College of Arts and Sciences who want to major in FGSS can apply directly to the program. Undergraduate students in other colleges at Cornell will need to work out special arrangements and should speak to the FGSS 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 officially register either through FGSS or through the cross-listing department. Suggested entry-level courses include any FGSS course at the 200 level, especially 201 and 202, both of which are required for completion of the major. FGSS courses at the 200 level or above may count as both prerequisites and as part of the major. First-year writing seminars, in contrast, may count as prerequisites but not as part of the major.

2. Required course work:
   a. A minimum of 36 credits in FGSS courses is required for the major. No course in which the student has earned less than a C- can count toward these 36 credits. As noted above, for FGSS courses that are cross-listed with another department, students may officially register either through FGSS or through the cross-listing department.
   b. These 36 credits must include three courses specifically required of all FGSS majors:
      - FGSS 201 (Introduction to FGSS Studies)
      - FGSS 202 (Introduction to FGSS Theories)
      - FGSS 400 (Senior Seminar in FGSS Studies)
   c. These 36 credits must also include at least one FGSS course with a significant focus on each of the following three categories: (Note that, 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 (Students may choose from the list in the course catalog or at FGSS office)
      - Intersecting Structures of Oppression: Race, Ethnicity, and/or Class (Students may choose from the list in the course catalog or at FGSS office)
      - 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 FGSS office)

Students with a double major may count up to three FGSS courses toward their FGSS major that they are simultaneously counting toward a second major.

The Honors Program: To graduate with honors, a FGSS major must complete a senior thesis under the supervision of a FGSS faculty member and defend that thesis orally before an honors committee. To be eligible for honors, students must have at least a cumulative grade point average of 3.0 in all course work and a 3.3 average in all FGSS courses that are cross-listed with another department.

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. For more information about the honors program, see FGSS 499 and the "Guidelines for a Senior Honors Thesis" available in the FGSS Program office.

The FGSS Concentration

Undergraduate students in any college at Cornell may concentrate in Feminist, Gender, & Sexuality Studies in conjunction with a major defined elsewhere in the university. The concentration consists of five FGSS courses (officially registered either through FGSS or through 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 statutory colleges, who may petition the DUS in FGSS to count one class from their major toward the FGSS concentration.) As with the FGSS major, first-year writing seminars cannot be included within the five required courses. Students wishing to concentrate in FGSS should see the DUS. The five courses required for the FGSS Undergraduate Concentration must include:
   - FGSS 201 (Introduction to FGSS Studies)
   - FGSS 202 (Introduction to FGSS Theories)

Any FGSS course that satisfies at least one of the three categories required for a major (see above).

Any two additional FGSS courses of the student’s choosing.

The LBG Concentration

FGSS serves as home to the Lesbian, Bisexual, and Gay Studies Program, which offers an undergraduate concentration as well as a graduate minor. The LBG undergraduate concentration consists of four courses. For a complete listing of all courses that will fulfill this concentration please see the LBG Studies portion of this catalog.

I. First-Year Writing Seminars

FGSS 106 FWS: Women and Writing (also ENGL 105)
Fall and spring. 3 credits. Staff.
For description, see ENGL 105.

[FGSS 116 Writing Modern Women (also GERST 116)]
Fall. 3 credits. Not offered 2004–2005.
D. Reese.

FGSS 121 Butches, Bitches, and Buggers: A Survey of Queer Drama (also THETR 120)
Fall. 3 credits. M. Brodie.
For description, see THETR 120.

[FGSS 130 FWS: Self-Portraiture and the First Person in Twentieth-Century Works by Women]
D. Reese.

II. Courses

FGSS 201 Introduction to Feminist, Gender, and Sexuality Studies (III or IV) (CA)
Fall. 4 credits. K. McCullough and S. Martin.

Feminist, Gender, and 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. In this class we focus 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. We read a variety of texts, personal narratives, historical documents, and cultural criticism across a range of disciplines. In doing so we consider how larger structural systems of both privilege and oppression affect individuals’ identities, experiences, and options, and simultaneously we examine forms of agency and action taken by women in the face of these larger systems.

FGSS 202 Introduction to Feminist, Gender, and Sexuality Theories (IV) (CA)
Spring. 4 credits. D. Reese.

This course introduces students to critical approaches in feminist scholarship to the cultural, socioeconomic, and political situations 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 will include literary texts and visual images.
[FGSS 203 Work and Family (also SOC 203)]

[FGSS 205 Introduction to World Literatures in English (also ENGL 205)]
Spring. 4 credits. E. Deloughrey.
For description, see ENGL 205.

[FGSS 206 Gender and Society (also D SOC 206)]
Spring. 3 credits. Staff.
For description, see D SOC 206.

[FGSS 209 Seminar in Early America (also HIST 209)]
M. B. Norton.

[FGSS 212 African American Women: Twentieth Century (also HIST 212 and AM ST 212)]
For description, see HIST 212.

[FGSS 214 Biological Basis of Sex Differences (also BIOAP 214 and B&SOC 214)]
Spring. 3 credits. J. Fortune.
For description, see BIOAP 214.

[FGSS 215 Gender, Nationalism, and War (also GOVT 215)]
Spring. 3 credits. M. Evangelista.
For description, see GOVT 215.

[FGSS 216 Gender and Colonization in Latin America (also HIST 216)]
K. Graubart.

[FGSS 225 Global Sex Work (also ANTHR 225)]
Fall. 3 credits. L. Faier.
This course explores the overlaps and tensions among sex workers' issues and feminist issues on a global scale. In it, we grapple with questions such as: How does one define sex work? Are sex workers' issues feminist issues? And what social and political economic forces shape the lives of people engaged in sex work, and how do they negotiate them? Focusing on the experiences, perspectives, and activism of sex workers around the world, we also explore key debates in feminist studies: the cultural construction of sex, gender, and sexuality; the social production of sexed, gendered, and sexualized bodies; the social construction of women's work; and the tensions and engagements between feminist theory and feminist activism.

[FGSS 235 Rewriting the Classics: Stories of Travel and Encounters (also ENGL 235)]
E. Deloughrey.

[FGSS 238 The Historical Development of Women as Professionals, 1800–1997 (also HD 258, HIST 276, and AM ST 278)]
J. Brumberg.

[FGSS 241 New York Women (also HIST 241)]
M. Rosostik.

[FGSS 244 Language and Gender Relations (also LING 244)]
S. McConnell-Ginet.

[FGSS 246 Contemporary Narratives by Latina Writers (also SPANL 246 and LSP 246)]
Fall. 3 credits. L. Carrillo.
For description, see SPANL 246.

[FGSS 249 Feminism and Philosophy (also PHIL 249)]
Fall. 4 credits. N. Sethi.
For description, see PHIL 249.

[FGSS 251 Twentieth-Century Women Writers (also ENGL 251)]
Spring. 4 credits. K. McCullough.

[FGSS 252 Late Twentieth-Century Women Writers and Visual Cultures (also ENGL 252 and VISST 252)]
Spring. 4 credits. S. Samuels.
For description, see ENGL 252.

[FGSS 262 Introduction to Asian American Literature (also ENGL 262, ASIAN 262, AM ST 262)]
S. Wong.

[FGSS 263 Studies in Film Analysis: Monsters and Misfits: Hollywood's Misogynist Myths of Women (also ENGL 263)]
Spring. 4 credits. L. Hanson.
For description, see ENGL 263.

[FGSS 273 Women in American Society, Past and Present (also HIST 273)]
M. B. Norton.

[FGSS 276 Desire (also ENGL 276 and COM L 276)]
Spring. 4 credits. E. Hanson.
For description, see ENGL 276.

[FGSS 279 Queer Fiction (also ENGL 278)]
E. Hanson.

[FGSS 280 Introduction to Lesbian Fiction (also ENGL 279)]
K. McCullough.

[FGSS 285 Gender and Sexual Minorities (also HD 285)]
Fall. 3 credits. K. Cohen.
For description, see HD 285.

[FGSS 307 African-American Women in Slavery and Freedom (also HIST 303 and AS&RC 307)]

[FGSS 309/509 The Sociology of Marriage (also SOC 309/509)]
M. Clarkberg.

[FGSS 310 Gender Inequality (also SOC 316)]
S. Szelenyi.

[FGSS 311 Sex and Gender in Cross-Cultural Perspective (also ANTHR 311/621)]
Fall. 4 credits. K. March.
For description, see ANTHR 311/621.

[FGSS 327 Shakespeare: Gender and Power (also ENGL 327)]
B. Corrrell.

[FGSS 344 Male and Female in Chinese Culture and Society (also ANTHR 344)]
S. Sangren.

[FGSS 348 Studies in Women's Fiction (also ENGL 348)]
Fall. 4 credits. E. DeLoughrey.
For description, see ENGL 348.

[FGSS 355 Decadence (also ENGL 355 and COM L 355)]
Fall. 4 credits. E. Hanson.
For description, see ENGL 355.

[FGSS 356 He Said, She Said: The Battle of the Sexes in Medieval and Renaissance Writing (also ENGL 356)]
Spring. 4 credits. K. Long.
For description, see ENGL 356.

[FGSS 360 Gender and Globalization (III) (SBA)]
Fall. 3 credits. L. Beneria.
This course invites students to think globally about gender issues and to trace the connections between global, national, and local perspectives. Emphasis is given to: a) understanding processes of globalization (economic, political, cultural); b) discussing the ways in which these processes interact with the dynamics of gender differentiation; c) understanding how globalization has affected women's and men's paid and unpaid work; d) discussing the significance of women's location in global markets; e) looking at the importance of culture and the social construction of gender in shaping the ways in which globalization affects people's lives and gender relations; f) introducing regional differences and similarities; g) discussing the gender dimensions in the debates on "the clash of civilizations;" h) introducing questions of global governance and examining specific cases that illustrate women's role in the shaping of international debates.
The course combines theoretical and empirical readings/discussions.

[FGSS 361 Impressionism in Society (also ART H 362)]
Fall. 4 credits. L. Meixner.
For description, see ART H 362.

[FGSS 368 Marriage and Sexuality in Medieval Europe (also HIST 368, RELST 368)]
Fall. 4 credits. P. Hyams.
For description, see HIST 368.

[FGSS 369 Fast-Talking Dames and Sad Ladies (also ENGL 369 and FILM 367)]
Fall. 4 credits. L. Meixner.
For description, see ENGL 369.

[FGSS 377 Concepts of Race and Racism (also GOVT 377)]
A. M. Smith.

[FGSS 384 History of Women and Unions (also ILRCB 384)]
I. DeVault.

[FGSS 394 Gender and Sexuality in Early Christianity (also NES 394 and RELST 394)]
K. Haines-Eitzen.
FGSS 396 Introduction to Global Women’s Literature (also ENGL 396) 4 credits. Not offered 2004–2005. E. Deloughery]

FGSS 399 Undergraduate Independent Study Fall and spring. 1–4 credits. Prerequisites: one course in FGSS and permission of a faculty member of FGSS. Staff.

FGSS 400 Senior Seminar in Feminist, Gender, and Sexuality Studies Fall. 4 credits. FGSS majors only. Required for FGSS majors. A. Villarejo. Although the topic/focus of this course surely varies with the instructor, it is always treated as a broad capstone course for majors.


FGSS 405/605 Domestic Television (IV) (SBA) 4 credits. Not offered 2004–2005. A. Villarejo. This course is a seminar on television as technology and cultural form, focusing on the “domestic” as a synonym for gendered value-coding, an axis of the international division of labor (and questions of television’s dissemination and circulation), and a site for historical exploration. The course balances readings in television and cultural theory (Spigel, Dienst, Wink, Williams, Feuer, Modleski, Mellencamp, Shattuc, Spivak, and others) with close analysis of television as information, entertainment, furniture, technology, text, genre, flow, channel, and circuit of production of the commodity audience. Students may enroll in either undergraduate or graduate level with graduate students submitting a longer paper and doing supplementary readings.

FGSS 410 Health and Survival Inequalities (also SOC 410) Fall 4 credits. A. Basu. For description, see SOC 410.

FGSS 411/411 Seminar: Devolution and Privatization: Challenges for Urban Public Management (also CRP 412/612, ARME 433/633) Fall. 4 credits. M. Warner. For description, see CRP 412.


FGSS 420/620 Government Policy Workshop (also CRP 418/618) Spring. 4 credits. M. Warner. For description, see CRP 418/618.

FGSS 421 Theories of Reproduction (also SOC 421) Spring. 4 credits. A. Basu. For description, see SOC 421.

FGSS 423 Sex in French (also FRLIT 442/642) Spring. 4 credits. C. Howie. For description, see FRLIT 422.


FGSS 438 Female Adolescence in Historical Perspective, 1815-1960 (also HD 417, HIST 455 and AM ST 417) Spring. 3 credits. J. Brumberg. For description, see HD 417.

FGSS 441 Historical Issues of Gender and Science (also S&TS 444) Spring. 4 credits. S. Seth. For description, see S&TS 444.

FGSS 445 American Men (also HIST 444) Spring. 4 credits. E. Bapt. For description, see HIST 444.

FGSS 446 Women in the Economy (also ILRLE 445 and ECON 457) Spring. 4 credits. F. Blau. For description, see ILRLE 445.

FGSS 448 Global Perspectives on Violence against Women (also PAM 444) Fall. 3 credits. A. Parrot. For description, see PAM 444.


FGSS 455 Bad Boys: A Historical Research Seminar (also HD 455) Fall. 4 credits. M. Steinberg, S. Stewart. For description, see HIST 456.


FGSS 457 Diversity and Employee Relations (also ILRHR 463) Fall. 3 credits. M. Berg. For description, see ILRHR 463.

FGSS 465 Feminist Theory/Lesbian Theory (also COM L 465 and GERST 465) (IV) 4 credits. Not offered 2004–2005. A. Villarejo. This seminar explores development in feminist theory, primarily in the United States from the 1950s through the mid-1990s. We also trace the changing status of “lesbianism” in feminist theories over that same time period and examine its status in current constructions of “queer theory.” What happens to the relationship between feminist theory and lesbian thought when “queer theory” emerges? The purpose of the course is to encourage critical, historically informed readings of what could be considered canonical texts and crucial junctures in Second Wave feminist thought, many of which remain unfamiliar even to FGSS students.


FGSS 475/675 Advanced Undergraduate Seminar in Global Feminisms: Naming Women and Globalization Fall. 3 credits. D. Reese. Recent international treaties have designated a “trade barrier” as a primary term in legislative negotiations between nation-states. In this course, we explore the implications of this particular economic form of valuation for larger questions of social justice. How do certain values appear as values, how are they coded, and how are they read? What of values that are unable to appear under the lens of the term “trade barrier” such as communal property, domestic labor, or historical justice? Can projects for social equality appear within the calculations of global capital? If so, how and under what auspices? How and when are human rights and women’s rights articulated within this context? A corollary issue for our discussion is the category of “nature” in its relation to national sovereignty. Sometimes considered a universal “inheritance of man,” other times a form of state or private property, “nature” is at the center of disputes concerning intellectual property rights, while women are often named the custodians of natural resources in U.N. documents. How are women’s lives implicated in particular approaches to assigning value to nature (both juridical and economic)? How can feminist critiques address these incommensurate forms of value in which women, in the new, global economy, have become enmeshed?


FGSS 477 Intersections in Lesbian Fiction (also ENGL 478 and AM ST 468) Spring. 4 credits. K. McCullough. For description, see ENGL 478.
To graduate with honors, a major must have a cumulative grade point average of 3.0 or higher. Students must also complete a thesis orally before an honors committee. To be eligible for honors, students must have at least a cumulative grade point average of 3.0 in all courses and must complete a 3,4 average in all courses applying to their FGSS major. Students interested in the honors program should find common intellectual ground around a 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 department’s offerings in English begin with a series of First-Year Writing Seminars introducing various aspects of German literature (for example, the fairytale and romantic consciousness or twentieth-century writers such as Kafka, Hesse, Mann, Brecht), theorists such as Marx, Nietzsche, and Freud, issues in mass culture and modernity, problems of German national identity/ies, and cinema and society. Courses in German and English at the 300 and 400 levels explore such topics as the Faust legend, aesthetics from Kant to Heidegger, city typographies, and sexuality studies.

The Department of German Studies offers students a wide variety 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 department’s offerings in English begin with a series of First-Year Writing Seminars introducing various aspects of German literature (for example, the fairytale and romantic consciousness or twentieth-century writers such as Kafka, Hesse, Mann, Brecht), theorists such as Marx, Nietzsche, and Freud, issues in mass culture and modernity, problems of German national identity/ies, and cinema and society. Courses in German and English at the 300 and 400 levels explore such topics as the Faust legend, aesthetics from Kant to Heidegger, city typographies, and Freud and his legacy, opera from Mozart...
to Strauss, the German novel, political theory and cinema, the Frankfurt School, 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.

Students wishing to begin German language at Cornell enroll in GERST 121-122, 123 (introductory language level). Students then continue with intermediate-level courses, which provide further grounding in the language as well as introduce German literature and cultural studies. The sequence GERST 205-206 provides instruction for German in the culture of business, leading to certification. On the advanced level (300 level or above), we offer thematically oriented courses that include intensive language work (301, 302, 310); 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.

Sequence of courses
Courses in German:
Introductory level: GERST 121-122, after completion, placement into GERST 125 or 200, 205
Intermediate level: GERST 200, 202, 204, and 205-206
Advanced level: GERST 301, 302, 307, 310, 410
Courses in German or English: further 300- and 400-level literature and culture courses (see course descriptions)

Advanced Standing
Students with an AP score of 4 or better are automatically granted three credits in German. Students with an AP score of 4 or better, an LPG score of 65 or higher, or an SAT II score of 690 or higher must take the CASE examination for placement in courses above GERST 200. Students coming to Cornell with advanced standing in German and/or another subject are encouraged to consider a double major and to discuss the options with the director of undergraduate studies as early as possible.

Certificate in German Language Study
The Certificate in German Language Study is issued to recognize substantial language study beyond the GERST 200/205 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 300 level or above.

Internships
The department works with the USA-Intern program to provide a limited number of summer internships to qualified students with German companies and agencies. Interested students should contact Gunhild Lischke (gL15@cornell.edu, G75 Goldwin Smith Hall, 255-0725) 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 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, & 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, Peter Gilgen, 192 Goldwin Smith Hall.

German (Literature and Culture)
Students in this major select courses from the department and may pursue individual interests in literature, film and visual culture, theater and performing arts, music, intellectual and political history, and women's studies. Please consult with the director of undergraduate studies.

Admission: By the end of their sophomore year, prospective majors should have successfully completed GERST 202, 204, or 206.

To complete the major, a student must:
1) Demonstrate competence in the German language by successful completion of two 300-level courses with intensive language work (GERST 301, 302, 310) or the equivalent.
2) Complete six courses in German Studies at the 300 level or above. One of these must be the Senior Seminar (GERST 410).
3) Select a faculty adviser 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, & Sexuality Studies.

Admission: By the end of their sophomore year, prospective majors should have successfully completed GERST 202, 204, or 206.

To complete the major, a student must:
1) Demonstrate competence in the German language by successful completion of two 300-level courses with intensive language work (GERST 301, 302, 310) or the equivalent.
2) Complete six courses with a substantial German component at the 300 level or above. Three of these must be in German Studies, including the Senior Seminar (GERST 410).
3) Select a committee of one or more faculty advisers to help formulate a coherent program of study. One of the advisers must be from the Department of German Studies.

Honors
Eligibility: A student wishing to receive honors in German Studies must have a GPA of 3.5 in all courses relevant to the major.

Committee: Candidates for honors form an advisory committee consisting of an adviser from German Studies and at least one additional faculty member.

Honors Essay: During the first term of their senior year, students determine the focus of their honors essay through an appropriate course, GERST 453, under the direction of their advisers. During the second term they complete an honors essay, GERST 454, which will be evaluated by the committee.

Determination of honors: An oral examination concludes the process. Honors is determined by the essay, the exam, and grades in the major.

Study Abroad in a German-Speaking Country
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 course should be at the 300 level.

Students interested in this or other study abroad options in Germany, Austria, or Switzerland should consult Gunhild Lischke (G75 Goldwin Smith; 255-0725, g75@goldwin Smith Hall, and in spring 2005, Bonnie Buettner (G77 Goldwin Smith; 255-3394, bgc3@cornell.edu).

First-Year Writing Seminars
Consult the John S. Knight Institute brochure for course times, instructors, and descriptions.

Courses Offered in German
GERST 121 Introductory German I
Fall or spring. 4 credits. Intended for students with no prior experience in German or with a language placement test (LPG) score below 37, or an SAT II score below 370. G. Lischke, U. Maschke, 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 122 Introductory German II**
Fall or spring. 4 credits. Prerequisite: GERST 121, LPG score 37–44, or SAT II 370–450. Students who obtain an LPG score of 56 or above after GERST 122 attain qualification and may enter a 200-level course; otherwise successful completion of GERST 125 is required for qualification. U. Maschke 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 123 Continuing German**
Fall or spring. 4 credits. Provides language qualification. Students who have previously studied German and have an LPG score 45–55 or SAT II 460–580. U. Maschke and staff. Students continue to develop their language skills by discussing a variety of cultural topics and themes in the German-speaking world. The focus of the course is on expanding vocabulary, reviewing major grammar topics, developing effective reading strategies, improving listening comprehension, and working on writing skills. Work in small groups increases each student's opportunity to speak in German and provides for greater feedback and individual help.

**GERST 200 Contemporary Germany (IV)**
Fall or spring. 3 credits. Provides language proficiency and satisfies Option 1. Prerequisite: qualification in German (GERST 125 or LPG score of 56–64 or SAT II score of 590–680) or placement by examination. H. Buettner and staff. A content-based language course on the intermediate level. Students study important aspects of present-day German culture while expanding and strengthening their reading, writing, and speaking skills in German. Materials for each topic are selected from a variety of sources (fiction, newspapers, magazines, and the Internet). Units address a variety of topics including studying at a German university, modern literature, Germany online, and Germany at the turn of the century. Oral and written work and individual and group presentations emphasize accurate and idiomatic expression in German. Successful completion of the course enables students to continue with more advanced courses in language, literature, and culture.

**GERST 202 Exploring German Literature (IV) (LA)**
Fall or spring. 3 credits. Satisfies language Option 1. Prerequisite: GERST 200 or 205 or equivalent or permission of instructor. Taught in German. B. Buettner and D. Reese. In this intermediate course, we read and discuss a number of works belonging to different literary genres by major German-speaking authors such as Kafka, Walser, Beeth, Marra, Dürrenmatt, Bachmann, and others. We 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 in this course focus on the development of reading competency in different literary genres, the improvement of writing skills including the accurate use of idiomatic expressions, the expansion of students' German vocabulary, and the systematic review of select topics in German grammar.

**GERST 204 Intermediate Conversation and Composition**
Fall or spring. 3 credits. Satisfies language Option 1. Prerequisite: GERST 200 or GERST 205 or placement by examination (placement score and CASE). G. Liesche and P. Gilgen. 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 205 Business German I**

**GERST 206 Business German II**

**GERST 301 Scenes of the Crime: German Mystery and Detective Fiction (IV) (LA)**
Fall. 4 credits. Prerequisite: GERST 202, 204, 206 or equivalent, or permission of instructor. Taught in German. This course may be counted towards the requirement for 300-level language work in the major. P. Gilgen. An exploration of German crime, detective, and mystery writing in texts ranging from the early nineteenth century to contemporary fiction. Authors may include Bernhard, Musil, Zweig, von Horvath, Mann, Goethe, Kaschnitz, and Schlink. Aimed at improving students' proficiency in aural and reading comprehension, as well as speaking and writing skills, with emphasis on vocabulary expansion, advanced grammar review, and stylistic development. Recommended to students interested in a combined introduction to literature and high-level language training. The sister course, GERST 302, Youth Adolescence, is taught in the spring term.

**GERST 302 Youth Culture: Adolescence in German Fiction (IV) (LA)**
Spring. 4 credits. Satisfies language Option 1. Prerequisite: GERST 202, 204 or 206 or equivalent or permission of instructor. Taught in German. B. Buettner. Examination of life, work, and cultural approaches to childhood, youth, and adolescence in texts ranging from the late eighteenth century to the present. Authors may include Bernhard, Musil, Zweig, von Horvath, Mann, Goethe, Kaschnitz, and Schlink. Aimed at improving students' proficiency in aural and reading comprehension, as well as in speaking and composition skills. Focus on high-level grammar review, stylistic and expository refinement and vocabulary expansion. Recommended for students wishing to combine intensive language training with reading and discussion of short fiction.

**GERST 305 Writing America (IV) (LA)**

**GERST 306 German Media**

**GERST 307 After the Fires: Divided Germany, 1945-1989 (IV) (CA)**
Fall. 4 credits. Satisfies language Option 1. Prerequisite: GERST 202, or 204, or 206, or equivalent or permission of instructor. Taught in German. L. Adelson. Introduction to the history and culture of Germany. In the wake of World War II, the victorious powers divided Germany into four zones of occupation. The sister course, GERST 308, Cold War, is taught in the spring term. Taught in German. L. Adelson. Introduction to the history and culture of Germany. In the wake of World War II, the victorious powers divided Germany into four zones of occupation. The sister course, GERST 308, Cold War, is taught in the spring term. Taught in German. L. Adelson.

**GERST 310 Berlin: Where the Wild Things Are (IV) (CA)**
Spring. 4 credits. Satisfies language Option 1. Prerequisite: GERST 202, 204, 206, or equivalent or permission of instructor. Taught in German. U. Maschke. Berlin has recently been declared the city of the world. Berlin as the place to be for politicians and profit-seekers, architects and artists, the rich and famous, but also for those seeking new thrills. Is this new Berlin pulsing once again with the vibrant energy of the 1920s or rather bearing the historical legacy of fascism and the divisions of the Cold War? With a focus on a wide variety of media, such as literature, film, architecture, music, political documents, the Internet, and MIT's hypermedia program Berliner Sehen, this course investigates the emergence and life of contemporary Berlin in the context of its history as the capital of Germany. Differing and sometimes contradictory representations of this unique city form the core of this course, which stresses the refinement of critical reading skills in German in addition to advanced writing, listening, and speaking skills in German. Especially suitable for students interested in study abroad, this course is open to all qualified students interested in high-level development of their German-language skills in the context of cultural studies.

**GERST 352 Kleist # (IV)**

**GERST 354 Schiller # (IV)**

**GERST 357 Major Works of Goethe (1749–1832) # (IV)**

**GERST 423 Avant-Garde and Neo-Avant-Garde: From Dada to the Wiener Gruppe, and Beyond (IV) (LA)**
Spring. 4 credits. Satisfies language Option 1. Prerequisite: GERST 301, or 302, or 310 or equivalent. Taught in German. P. Gilgen.
Provides an introduction to avant-garde modes of writing in German-language literature, and examines the affiliations of different forms of avant-garde. Peter Bürger's seminal work *Theory of the Avant-Garde* will serve as a first hypothesis regarding the original goals and later reversals of avant-garde aesthetics and politics. We will also discuss Peter Sloterdijk's analysis of German modernism and—especially—Dadaism. The main part of the course will be dedicated to the reading of primary sources from the early twentieth century—especially Dada poetry and manifestos (Arp, Ball, Hausenbeck, Schwitter, Serner, Tzara); neo-avant-garde works from the 1960s and 1970s (Artaud, Bayre, Handke, Jandl, Mayrock, Wiener); and contemporary texts committed to avant-garde modes of textual production (Egger, Jelinek, Pastor, Waterhouse). On the basis of close readings and comparative analyses, we will construct a rudimentary theory of the (neo-)avant-garde that may serve as a critical supplement to and expansion of Bürger's and Sloterdijk's accounts.

**Courses offered in English**

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.

**GERST 221 The Ethics of Imagining the Holocaust (also ENGL 221 and JWST 257) (IV) (LA)**


**GERST 237 The Germanic Languages (also LING 237) (III) (KCM)**


**GERST 318 “1800” # (IV)**


**GERST 320 Postwar German Novel (IV)**


**GERST 330 Political Theory and Cinema (also COM L 330, GOVT 370 and FILM 370) (IV) (LA)**


**GERST 340 Metropolis: Urban Sites in Literature (IV) (LA)**


**GERST 374 Opera and Culture (also COM L 377, MUSIC 374, and THETR 374) # (IV) (LA)**

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. Groos.

This course is designed to explore interrelationships between opera and cultural practice, using operas principally from the German and Italian repertoires (e.g., Mozart, Wagner, Verdi, Puccini, Strauss). Lectures and discussions will examine operatic representations of central issues in the culture of modernity, ranging from the eighteenth and nineteenth 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 twentieth-century opera or other media such as film and theatre.

**GERST 378 German Aesthetic Theory: From Kant to Hegel # (IV)**


**GERST 392 Minority Literature in the Federal Republic (IV)**


**GERST 395 Rilke: The Dulno Elegies and Sonnets to Orpheus (IV) (LA)**


**GERST 396 German Film (also COM L 396 and FILM 396) (IV)**


**Advanced Undergraduate and Graduate Courses**

**GERST 402 The Language of German Poetry (IV) (LA)**


**GERST 403 The Afro-Europeans (IV)**


**GERST 405 Introduction to Medieval German Literature I # (IV) (LA)**

Fall. 4 credits. Prerequisite: reading knowledge of German. A. Groos.

A brief introduction to basic aspects of the medieval universe, ranging from cosmology to psychology, readings will focus on introductory texts of late-twelfth-century courtly culture. Using the predominant genres of aristocratic self-representation, the heroic epic (Nibelungenlied), and the Autobiographical works (Hartmann's Erec or Iwain), and Minnesang, discussions will investigate the court as the focus of conflicting forces in the rise of the secular culture in Germany, examining such issues as the construction of social and sexual identity, generational conflicts within the communal-dynastic order, the rise of individualism (the knightly quest), and subjectivity (the love lyric).

**GERST 406 Introduction to Medieval German Literature II # (IV)**

Spring. 4 credits. Prerequisite: GERST 405 or equivalent, or permission of instructor.

This is the anchor course for the medieval period. A. Groos.

Political lyrics by Walther von der Vogelweide will introduce agendas of conflict in thirteenth-century Germany, ranging from crusades to civil war. Against this background, we will examine the utopian quest to win the Holy Grail and heal the Fisher King in Wolfram's Parzival, using Bakhit's approach to the Grail discourse. Readings from the love lyric trace representation of gender across emerging class differences, the increasing complexity of self, and instability of the performance text. Concluding topics include women mystics and medieval narratives of socio-sexual violence, anti-Semitism, and urban angst.

**GERST 407 Teaching German as a Foreign Language**

Fall. 4 credits. G. Lischke.

This course has been designed to familiarize students with current ways of thinking in the field of applied linguistics and language pedagogy. It introduces different concepts of foreign language methodology as well as presents and discusses various techniques as they can be implemented in the foreign language classroom. Special consideration is given to topics such as planning syllabi, writing classroom tests, and evaluating students' performance. Participants conduct an action research project.

**GERST 408 Uncanny Communities (IV)**


**GERST 409 Spinoza and New Spinozism (also COM L 442) (IV) (LA)**


**GERST 410 Senior Seminar**

Fall. 4 credits. Open to all students with an adequate command of German. Prerequisite: any course at the 300 level taught in German, or equivalent, or permission of instructor. Readings and discussions in German. A. Schwarz.

Topic: Love as Fiction: German Novellae from Three Centuries. Examination of love as a literary motif in novels ranging from the eighteenth to the twentieth century. Special attention is given to the following questions: love as a mediator of social attitudes toward family and kinship; love as an aesthetic theory. Authors include Goethe, Schiller, Schlegel, Kleist, Fontane, Storm, Mann, Strauss, and Böll.

**GERST 412 German Literature from 1770 to 1848 # (IV)**


**GERST 413 Women around Freud (also COM L 412 and FGSS 433) (IV)**


**GERST 415 Marx, Nietzsche, Freud (also COM L 425 and GOVT 473) # (III or IV) (CA)**

Spring. 4 credits. G. Waite.

There are three main aspects to this course. First and primarily, it provides an introduction to the thinking of these three "master thinkers" who have determined much of modernity and postmodernity. Here, basic aspects of their work are considered: a) scientific and theoretical writings; b) specific critical and historical analyses; c) programs and manifestos; and d) styles of argumentation, documentation, and persuasion. Second, we will compare and contrast the underlying assumptions and interpretive yields of the various disciplines and practices that Marx, Nietzsche, and Freud helped to ground: historical materialism and communism; power-knowledge analysis; and psychoanalysis, respectively. Finally, but less thoroughly, we will discuss the ways these three thinkers have been fused together into a single triumvirate or triad: "Marx—Nietzsche—Freud." The main focus of the course will be on primary texts, which might include, e.g.: (Marx) The Communist Manifesto, The 18th Brumaire, Critique of the Gotha Program, and selections from The Paris Manuscripts, Grundrisse, and Capital; (Nietzsche) The Birth of Tragedy, "The Greek State," On Truth and Lie in the Extramoral Sphere, On the Use and Disadvantage of History for Life, and selections from Thus Spoke Zarathustra and The Genealogy of Morals; and (Freud) two case studies, "On Dreams, Civilization and Its Discontents," Three Essays on the Theory of Sexuality," and selections from The Psychopathology of Everyday Life and Introductory Lectures.

**GERST 416 Kafka In/On Translation (also COM L 416)**

Spring. 4 credits. W. Kittler.

**GERST 417 Faust: Transformations of a Myth (also COM L 417) # (IV) (CA)**


**GERST 418 Thomas Mann (IV)**

[GERST 428] Genius and Madness in German Literature (also COM L 409) (IV) 

[GERST 430] Broch, Artaud, Müller, Wilson (also COM L 430 and FILM 420) (I) 

[GERST 431] Modern Drama (also THETR 431 and COM L 405) 
Fall. 4 credits. Prerequisite: some theatre history and dramatic-literature work at the 300 level or permission of instructor. D. Bathrick. 
For description, see THETR 431.

[GERST 435] Introduction to Literary Theory (also COM L 435) (IV) 

[GERST 439] Poetry and Poetics of Translation (also COM L 439, COM L 643, ENGL 641, ROM S 439, ROM S 639, and S HUM 439) 
Fall. 4 credits. Limited to fifteen students. J. Monroe. 
For description, see COM L 439.

[GERST 441] Introduction to German Linguistics (also LING 441) (III) (HA) 

[GERST 447] Reading Freud: Gender, Race, and Psychoanalysis (also COM L 447 and FGSS 447) (IV) 

[GERST 449] Rescreening the Holocaust (also COM L 453, FILM 450 and RELST 450) (IV) (LA) 

[GERST 451-452] Independent Study 
451, fall; 452, spring. 1-4 credits each term. Prerequisite: permission of instructor.

[GERST 453] Honors Research 
Fall. 4 credits. Staff.

[GERST 454] Honors Thesis 
Spring. 4 credits. Staff.

[GERST 457/657] Imagining the Holocaust (also COM L 483/683, ENGL 458/658, and JWST 458/658) (IV) (LA) 
Spring. 4 credits. D. Schwarz. 
For description, see ENGL 458/658.

[GERST 472] Poetry of the 1990s (also COM L 472) (IV) 

[GERST 492] The Advance of Humanism: Aspects of the European Enlightenment # (IV) 

[GERST 495] The Cultural Theory of the Frankfurt School (also COM L 495, GOVT 471) (III or IV) 

[GERST 496] Theorizing the Public Sphere (also COM L 496 and GOVT 464) (III or IV) 

[GERST 498] German Literature in Exile (IV) 

Graduate Courses 
Note: For complete descriptions of courses numbered 600 or above consult the appropriate instructor.

[GERST 600] Special Topics in Feminist Theory (also ANTHR 600 and COM L 600) 

[GERST 605] Graduate Seminar in European Cultural and Intellectual History (also GOVT 467 and HIST 605) 
Spring. 4 credits. M. Steinberg. For description, see HIST 605.

[GERST 606] Topics in Historical Germanic Phonology 

[GERST 607] Topics in Historical Germanic Morphology 

[GERST 608] Topics in Historical Germanic Syntax 

[GERST 614] Gender at the Fin-de-siècle 

[GERST 615] Jews in German Culture Since 1945 (also JWST 615) 
Spring. 4 credits. Required readings in German. Class discussion in English. L. Adelson. 
Amidst widespread discussion of Holocaust memory as a "globalized" phenomenon, which becomes increasingly unhinged from the historical referent, this seminar explores literature written in German since 1945, largely by Jewish authors, on the subject of Jewish life and German history. For these writers and their texts, the historical encounter with National Socialism remains pivotal to a broad range of aesthetic strategies for representing the complexity of Jewish life in West, East, and unified Germany. Readings include works by authors such as Elisabeth Langgässer, Nelly Sachs, Paul Celan, Hans Kellson, Peter Weiss, Edgar Hilsenrath, Grete Weil, Jeannette Landes, Esther Dischereit, Irene Dische, Rafael Seligmman, Maxim ßiller, Barbara Honigmann, and others. This material will be considered against the larger background of postwar German attempts to represent both Jewish identity and the Holocaust. To this end the course will consider pivotal crises of representation such as those reflected in the Faßbinder docudrama "Debate the competition for a "German national monument to the murdered Jews of Europe," Daniel Goldhagen's reception in Germany, and recent debates about anti-Semitism. Additionally, we will consider how these literary works and cultural contexts are relevant to international cultural studies in memory, diaspora, "hybridity," and the aesthetics of representation.

[GERST 617] Literature and Affect (also COM L 625) 

[GERST 618] "The Science of the Experience of Consciousness": Hegel's Phenomenology of Spirit (and Beyond) 

[GERST 621] Issues in Gay and Lesbian Studies (also FGSS 621) 

[GERST 623] Aesthetic Turns: The Fin-de-siècle 

[GERST 624] Seminar in Medieval German Literature 

[GERST 625] Culture's Threshold: Speculative Fictions from Rousseau to Freud (also COM L 658) 
Spring. 4 credits. Prerequisite: graduate student status, or senior undergraduate status with permission of instructor. D. Reese. 
In this course we will read a survey of works of philosophy, anthropology, cultural history, and psychoanalysis from 1740 to 1930. In a traceable convention in European letters, philosophical speculation on political, economic, and cultural affairs has often taken the form of counterfactual or speculative fictions housed within argumentative texts. These philosophical fictions imagine origins (of language, states, exchange economies) as they attempt to figure the threshold to particular political, economic, or cultural arrangements. Though they conjure with an imaginary past, these fictions are rhythmically informed by the present and are future-directed. Often presenting themselves as experiments in writing, they supplement the argument within which they are framed in various ways. Some questions we might address in the course of our reading are: Why does the argument "need" to move to fiction and how does philosophy, in turn, motivate the conventions of narrative? How are we to construe the presence or absence of sexual and species difference at the core of the tale? Further, how does temporal displacement serve reflection on social forms? Primary readings include: Rousseau, Herder, Kant, Hegel, Humboldt (Wilhelm), Marx, Nietzsche, Freud, Mauss, Leiris. Other readings include: Butler, Spivak, Derrida, Lotringer, Deleuze, Zizek.

[GERST 626] Nuremberg 

[GERST 627] Baroque (also COM L 626) 

[GERST 628] Robert Walser: Revolutions in Narrative 
Spring. 4 credits. A. Schwarz.

Walser's prose works force the reader to a re-evaluation of traditional narrativetheories and literary models. Unique in style, movement, tempo, and genre, Walser cannot easily be categorized or appropriated: the elusive character of his work points to the limits of hermeneutic interpretation and the applicability of new interpretive criteria. Special focus is placed on narrative as stasis and movement; interruption and narrative coherence; completion and fragmentation; surface and depth. This seminar contextualizes Walser's work by frequent comparisons to other "unique" authors such as Jean Paul, Stifter, Kleist, and Bernhard. An overview of narrative theory introduces the class. Texts in German, discussion either in English or German.

[GERST 629] The Enlightenment 
Spring. 4 credits. Anchor course. P. U. Hohendahl. 
The seminar will focus on eighteenth-century German literature and philosophy from 1750 to 1790. Emphasis will be placed on the concept of Aufklärung and its meaning for the development of German thought. The discussions will stress major areas of critical inquiry, such as religion, philosophy,
and literature. Readings will be taken from authors like Forster, Gellert, Gotschel, Kant, Lessing, and Wieland. The critical literature will include the writings of Adorno, Foucault, Habermas, Horkheimer, and Koselleck.

[GERST 630] Classicism and Idealism

[GERST 631–632] Academic German I and II
651. fall; 652. spring. 3 credits each term. Limited to graduate students. Prerequisite: for GERST 632, GERST 651 or equivalent. Staff.

Intended primarily for beginners with little or no previous German knowledge. Emphasis in 651 on acquiring basic German reading skills. Emphasis in 652 on development of the specialized vocabulary of student's field of study.

[GERST 634] German Romanticism

[GERST 635] The Gates to Modernity: From Karlbad to the 1848 Revolution

[GERST 636] Kleist and Kafka: Prose Works

[GERST 637] Nineteenth-Century Fiction: The Realist Project

[GERST 640] The Modern German Novel
Not offered 2004–2005. A. Schwarz

[GERST 647] German Literature from 1949 to 1989
Not offered 2004–2005. L. Adelson

[GERST 650] Culture in the Weimar Period
Fall. 4 credits. Anchor course. Prerequisite: Reading knowledge of German. D. Bathrick.

This survey course will treat major developments in the area of German culture (literature, cinema, philosophy, mass culture, painting) between 1919 and 1933. Individual representative texts will be studied and discussed in their relation to the cultural, political, and social contexts out of which they emerge. Lectures and discussions will focus both on the detailed interpretation of individual works as well as on the general historical background and developments of the period.

[GERST 652] Culture in Germany 1933–1945

[GERST 653] Opera [also COM L 655 and MUSIC 679]
Not offered 2004–2005

[GERST 656] Aesthetic Theory: The End of Art [also ART H 447, COM L 656, and VISST 458]
Fall. 4 credits. P. Gilgen.

This course investigates the emergence of aesthetics as its own discipline at the end of the eighteenth century. In a first phase, we will examine the rationalist articulation of aesthetics in Baumgarten's work and the empiricist theory of taste, particularly Burke's Enquiry. Drawing on the findings of these two traditions, Kant's Critique of Judgement (1790) inaugurated a preoccupation in German philosophy around 1800 with the philosophical status of the beautiful and of art. Especially in Romantic theory and practice, art was meant to provide a solution to the philosophical dilemma in the wake of Kant's critical philosophy. But already in Hegel's Phenomenology, and more explicitly in the Encyclopedia and the Lectures on Aesthetics, art lost this elevated position in philosophy. Taking this observation as a guiding thread, the main part of the course is structured around in-depth readings that may include Kant, Schiller, Schelling, Schlegel, Novalis, Hölderlin, and Hegel. Further readings may include writings by contemporary philosophers and theoreticians—such as Derrida, Lyotard, de Man, Adorno, and Danto—whose work on aesthetics takes its starting point from the philosophical issues surrounding the emergence of aesthetic theory only to transcend these historical confines and formulate contemporary positions on the status of the aesthetic. The following questions will be addressed. What are the conditions for the move from the subjective judgment of taste (Kant) to objective beauty (the Romantics, Hegel)? How is the relation of art and nature reconceived by the Romantics? What is the relation of aesthetic theory and the history of art? Is philosophy the end of art?

[GERST 658] Old High German/Old Saxon

Some of the most powerful analyses of 'visual culture' have come from outside or on the peripheries of the academic institutions designed to study it. At the same time, in a climate when focus is on currently more fashionable media, the great contributions to visual analysis made by art historians looking at oil paintings tend to be neglected. This seminar analyzes the interactions between 'traditional' disciplines, such as iconography and connoisseurship, and innovations coming from philosophy, psychoanalysis, historiography, sociology literary theory, feminism, and Marxism. We will develop 1) a general theory of 'visual ideology,' that is, the gender, social, racial, and class determinations on the production, circulation, consumption, and appropriation of visual 'culture' from the Renaissance period until now and 2) specific critical practices that articulate those determinations. Examples are drawn mainly from the history of oil painting, but issues related to architecture, city planning, photography, and cinema also come up. In addition to art historians, authors include: Althusser, Benjamin, Copece, Deleuze, Derrida, Freud, Carlo Ginzburg, Karanati Kojin, Lacan, Lyotard, Jose Antonio Maravall, and Nietzsche.

[GERST 660] Visual Ideology (also COM L 660 and ART H 660)
Fall. 4 credits. G. Waite

GERST 660 Visual Ideology (also COM L 660 and ART H 660)
Fall. 4 credits. G. Waite

GERST 661 After the City: From Metropolis to Electropolis (also ARCH 338/638 and COM L 661)

[GERST 662] Hölderlin: Philosophy, Poetry

[GERST 663] Nietzsche and Heidegger (also COM L 663)

[GERST 664] Freud and the Fin de Siècle

[GERST 666] Ingeborg Bachmann

[GERST 667] "Minor" German Literatures? (also COM L 667 and GOVT 675)

[GERST 668] Literature and the Uncanny (also COM L 664)

[GERST 669] Modern Social Theory I (also GOVT 669)

[GERST 670] Modern Social Theory II: Political Theory and Aesthetics (also GOVT 670)
Spring. 4 credits. S. Buck-Morss

[GERST 671] Postcolonial Theory and German Studies (also COM L 668)
Not offered 2004–2005. L. Adelson

[GERST 672] German Opera Topic: Wagner (also MUSIC 674)

[GERST 674] Contemporary Poetry and Culture: 1968–1993 (also COM L 674, ENGL 697, and SPAN L 674)

[GERST 675] After the Divide: German Critical Theory of the Seventies and Eighties (also COM L 675 and HIST 675)

[GERST 676] Brecht in Context (also COM L 679 and THETR 679)

[GERST 680] Brecht, Müller, and the Avant-Garde (also COM L 676 and FILM 680)

[GERST 681] Reproducing Enlightenment: Paradoxes of the Body Politic (also COM L 681)

[GERST 682] Horkheimer: Philosophy, Poetry

[GERST 683] From Electric to Electronic Media (also COM L 653)
Fall. 4 credits. The reader contains the texts in English translation, but close reading of the originals is strongly recommended. W. Kittler.

The purpose of this course is to understand the conditions of data transmission, data storage, and data processing from the time of the telegraph to that of electronic media, i.e., from the early nineteenth century to the present. Exemplary readings of texts from literature, philosophy, and engineering are discussed to trace a history of such technologies as the telegraph, the telephone, radio, and the universal machine, a.k.a. the computer. Specific emphasis is placed on the difference between analogue and digital machines, the concepts of energy and information, various forms of encoding: AM, FM, and PCM; Markov chains; Kolmogoroff complexity; and the structure of centralized and distributed networks. Texts by Paul Baran, Walter Benjamin, Jorge Luis Borges, Charles Dickens, Peter Galison, Martin Heidegger, Franz Kafka, Heinrich von Kleist, Jacques Lacan, Gaisi Palins Secundus, Thomas Pynchon, Kurt Schwitters, Claude Shannon, Thomas Sömmering, August Strindberg, and Alan Mathison Turing.

[GERST 685] Gramsci and Cultural Politics (also COM L 685 and GOVT 675)
GERST 686 Althusser and Lacan (also COM L 686, FRLIT 623, and GOVT 679)
Fall. 4 credits. Reading knowledge of French not required. G. Waite.
This seminar takes up the old “dialogue” or “confrontation” between Marxism and psychoanalysis as it continues in our “postmodern” or “postcommunist” era, based on close readings of selected works by Louis Althusser and by Jacques Lacan. Specific topics include the significance of their personal relationship; the role of “anti-philosophical” Lacanian concepts in Althusser’s philosophy or “aleatory materialism” with writers of common interest (from Spinoza to Freud); the homology between the “return to Marx” and the “return to Freud”: their modes of interpretation and argumentation, the technique of “symptomatic reading,” differing concepts of “structure,” “overdetermination,” and “contradiction”; the question whether “ideology is (the) unconscious”: and their critiques of Marxism, Stalinism, and capitalism. Other writers include Badiou, Balibar, Butler, Copiec, Freud, Gramsci, Machiaveli, Marx, Mao, Negri, Spinoza, and Zizek.

[GERST 687 The Politics of German Democratic Republic Not offered 2004–2005.]


[GERST 690 Feminist Criticism and Theory (also FGSS 690) Not offered 2004–2005.]


[GERST 699 German Film Theory (also COM L 699 and FILM 699) Not offered 2004–2005.]

GERST 753–754 Tutorial in German Literature
Fall and spring. 1–4 credits per term. Prerequisite: permission of instructor.

Dutch

DUTCH 121–122 Elementary Dutch 121, fall; 122, spring. 4 credits each term. DUTCH 122 provides language qualification. Prerequisite: permission of instructor. M. Briggs.
Intensive practice in listening, speaking, reading, and writing basic Dutch in meaningful contexts. The course also offers insight into Dutch language, culture, and society.

DUTCH 203 Intermediate Composition and Conversation
Fall. 3 credits. Prerequisite: qualification in Dutch or permission of instructor. Provides language proficiency. M. Briggs.
Improved control of Dutch grammatical structures and vocabulary through guided conversation, discussions, compositions, reading, and film, drawing on all Dutch-speaking cultures. Taught in Dutch.


DUTCH 300 Directed Studies
Spring. 1–4 credits variable. Prerequisite: proficiency in Dutch or permission of instructor. M. Briggs.
Individualized advanced Dutch studies. This course 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. Taught in Dutch.

Swedish

SWED 121–122 Elementary Swedish 121, fall; 122, spring. 4 credits each term. Prerequisite: for SWED 122, SWED 121 or equivalent. L. Tranck.
Students in the course develop abilities in listening, speaking, reading, and writing within Sweden’s cultural context. Work on the Internet, interactive computer programs, and a virtual textbook are used in these courses.


SWED 203 Intermediate Swedish Fall. 3 credits. Provides language proficiency. Prerequisite: SWED 123 or permission of instructor. L. Tranck.
Intermediate to advanced-level instruction using audiovisual material and text to enhance language comprehension.


SWED 300 Directed Studies
Fall. 1–4 credits variable. Prerequisite: permission of instructor. L. Tranck.
Taught on a specialized basis to address particular student needs. Times arranged with instructor.

GOVERNMENT


Please visit the Government Department web site: http://falcon.arts.cornell.edu/GoVt

Government is what Cornell calls a department that elsewhere might be termed political science. The focus of this discipline is power applied to public purposes. Some faculty concentrate on purposes, some on applications. Some engage in the close reading of great texts of political philosophy, while others analyze the behavior of policymakers 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).

To accommodate new courses or course changes, a supplementary announcement is prepared by the department. Before enrolling in courses or registering each term, students are requested to consult the current supplement listing courses in government, available in 210 White Hall.

The Major
To be admitted to the major, a student must:
1) pass two of the introductory government courses (GOVT 111, 131, 161, 181);
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. 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 300 level or above;
4) complete at least one seminar-style course in government which may be applied toward the 28 credits. These courses include those numbered 400.XX to which students are admitted by application only, or other 400-level courses in which no more than 15 students are enrolled;
5) accumulate 11 credits in upper-level courses in related fields (such as anthropology, economics, history, science and technology studies, psychology, and sociology). Upper-level courses are usually courses numbered at the 300 level or above (200-level courses are not considered upper-level). Students should consult with their major adviser to choose appropriate courses. All choices of related courses must be approved by the major adviser or the director of undergraduate studies;
6) all courses used to fulfill a government major must be passed with a letter grade.

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: http://falcon.arts.cornell.edu/GoVt

Cornell in Washington Program.
Government majors may apply to the Cornell in Washington Program. Undergraduates with an interest in the Model European Community Simulation. Government majors may elect to group some of their required and optional courses in the area of European studies, drawing from a wide variety of courses in relevant departments. Students are invited to consult Professors P. Katzenstein, J. Pontusson, and S. G. Tarrow for advice on course selection and foreign study programs.

Model European Community Simulation. Undergraduates with an interest in the European Union, public affairs, or debating may participate in an annual European Union
simulation held, on an alternating basis, in April at SUNY Brockport or in January in Brussels. The simulation provides an opportunity for participants, representing political parties and the European Commission, to discuss issues and resolutions of current concern to the European Union.

To prepare for the simulation, a two-credit course is offered by the Government Department each year (GOVT 431 or GOVT 432). Participation in the simulation is open only to those who register for this course. Anyone interested in participating or finding out more information should contact the Institute for European Studies at 120 Ursi Hall, 255-7592.

International Relations Concentration. See the description under "Special Programs and Interdisciplinary Studies."

Honors. Application to the honors program is made in the early spring of the junior year. For more information about the Honors Program and an application form, please visit our web site: http://falcon.arts.cornell.edu/Govt.

Introductory Courses

Students registering for introductory courses should register for the lecture only. Sections are assigned during the first week of class. Introductory courses are also offered during summer sessions.

GOVT 111 Introduction to American Government and Politics (III) (SBA)  
Fall and summer. 3 credits. N. Winter. M. Jones-Coree. An introduction to government through the American experience. Concentration on analysis of the institutions of government and politics as mechanisms of social control.

GOVT 131 Introduction to Comparative Government and Politics (III) (SBA)  
Spring and summer. 3 credits. R. Herring. This course provides a survey of the institutions, political processes, and policies of contemporary states. It focuses on the conditions for and workings of democracy. Looking at Western Europe: we analyze institutional variations among liberal democracies, and their political implications. We then probe the origins of democracy in Western societies and the reasons why communism and other forms of authoritarian rule have prevailed elsewhere. Finally, we 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.

GOVT 161 Introduction to Political Philosophy (I) (III) (HA)  
Spring. 3 credits. I. Kramnick. A survey of the development of Western political theory from Plato to the present. Readings from the works of the major theorists. Attention given to the relevance of their ideas to contemporary politics.

GOVT 181 Introduction to International Relations (III) (SBA)  
Fall and summer. 3 credits. J. Kirshner. An introduction to the basic concepts and practice of international politics.

First-Year Writing Seminars

Consult the John S. Knight Institute brochure for times, instructors, and descriptions.

Major Seminars

GOVT 400 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. To apply, students should pick up an application in 210 White Hall during the pre-enrollment period.

American Government

GOVT 111 is recommended.

GOVT 301 Public Opinion and American Democracy (III) (HA)  
Spring. 4 credits. N. Winter. This course is organized around three broad themes: American state expansion in the late nineteenth century, the political economy of class and social inequality that shaped the party system and democratic politics generally, and the process of industrialization that propelled the United States into the front rank of the world economy by the turn of the century. The course is roughly divided into two sections. The first part stresses the importance of the Civil War and the coincident suppression of southern separation to subsequent American political development. The second part connects the national political economy and the central state established by the Civil War to the structure of the party system, operation of democratic institutions, and rapid industrialization during the last decades of the nineteenth century. Also included are comparison of Union and Confederate state formation during the Civil War. analysis of the political role of cotton production, and examination of the role of finance capital in industrial expansion, and a consideration of possible developmental trajectories other than the high-tariff, gold-standard one actually followed by the United States.

[GOVT 302 Social Movements in American Politics (also AM ST 302) (III) (HA)  
Fall. 4 credits. Not offered 2004–2005. E. Sanders. Analyzing a variety of movements from the late nineteenth century to the present, this course seeks answers to the following concerns: 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 the nature of politics and patterns of social interaction? The movements to be studied are populism; progressivism; labor; socialism; women's suffrage; the contemporary gender equality movement; protest movements of the 1950s; civil rights. Students for a Democratic Society and antiwar movements of the 1960s; environmentalism; the 1980s anti-nuclear (weapons) movement; gay rights; and the new religious right. Some theoretical works will be used, but most of our theoretical explorations will be inductively derived from studies of actual movements and the difficulties they faced.]

[GOVT 303 Imagining America (also COM L 341 and AM ST 326) (III) or (IV) (CA)  
Fall. 4 credits. Not offered 2004–2005. D. Rubenstein. This course addresses nineteenth- and twentieth-century European travel writing about America from Alexis de Toqueville's landmark work, Democracy in America, to Jean Baudrillard's polemical America and Umberto Eco's Travels in Hyperreality. We will be concerned with the question of what America, as both "utopian" ideal and as a living example, represents for the European philosophical thinker. For example, what role does national fantasy play in the encounters revealed in Julia Kristeva's excursion to American universities in The Strangers or in Simone de Beauvoir's guided (by Richard Wright) tour as recounted in her diary, American Day by Day? We also will discuss Francois-René de Chateaubriand's René and Atala as a literary limit case of intercultural exchange. We also will consider how race is implicated in these writings (e.g., de Toqueville, de Beauvoir; Kristeva's consideration of "the foreigner") and the pertinence of American genres such as the captivity narrative for readings of Chateaubriand or de Beauvoir and Beauvoir's writings on prison.]

[GOVT 309 Science in the American Polity (also S&T 391) (III) (SBA)  
Not offered 2004–2005. This course reviews the changing political relations between science, technology and the state in America from 1860 to the present. It focuses on the politics of choices involving science and technology in a variety of institutional settings, from Congress to courts and regulatory agencies. The tensions and contradictions between the concepts of science as an autonomous republic and as just another special interest provide the central theme for the course. Topics addressed include research funding, technological controversies, scientific advice, citizen participation in science policy, and the use of experts in courts.]

GOVT 311 Urban Politics (also AM ST 311) (III) (SBA)  
Spring. 4 credits. M. Shifter. Covers 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. Considers the implications of these political forces for policies pertaining to urban poverty, homelessness, and criminal justice.

GOVT 313 The Nature, Functions, and Limits of Law (III) (CA)  
Spring. 4 credits. Undergraduates only. Staff. A 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 limitations 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.
GOVT 314 Prisons (III) (SBA)
This seminar looks 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, chaplin’s offices) that alleviate the grim realities of prison life? We 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 on a Wednesday or Thursday evening, to hear guest speakers and see films.

GOVT 316 The American Presidency (III) (SBA)
Fall. 4 credits. E. Sanders.
This course explores and seeks explanations for the performance of the twentieth- to twenty-first-millennium presidency, focusing on its institutional role in a political development, recruitment process (nominations and elections), relationships to social groups, economic forces, and “political time,” and foreign and domestic policy making.

GOVT 317 Campaigns and Elections (III) (SBA)
Fall. 4 credits. W. Mebane.
This course examines campaigns and elections, focusing primarily on national elections in the United States. Topics include the relationship between elections and the economy, the weakness of the American party system, voter turnout, individual voting decisions, negative campaigning, and the noncompetitiveness of congressional elections. We examine several theories that explain these phenomena, including in particular the theory of rational choice. Course requirements include one or two papers based on original analysis of election survey data.

GOVT 318 U.S. Congress (III) (SBA)
Fall. 4 credits. M. Shetter.
The role of Congress in the American political system. Topics to be discussed: the political setting in which Congress operates, the structure of Congress, the salient features of the legislative process, and recent congressional behavior in a number of policy areas.

GOVT 319 Racial and Ethnic Politics (also AM ST 313 and LSP 319) (III) (SBA)
Spring. 4 credits. M. Jones-Corea.
In 1965 the landscape of American politics changed dramatically with the passage of the Voting Rights Act. That same year, Congress passed the Immigration Reform Act, which, though little heralded at the time, arguably had equally profound effects. This course provides a general survey of minority politics in the United States, focusing on the effects of these two legislatures. The course highlights the relationships between immigrants and minorities, electoral politics and protest politics, and between cooperation and competition within and among minority groups. The course is not only to point out the similarities and differences in the agendas and strategies adopted by minority groups, but to indicate the interaction between “minority” politics and American politics as a whole.

GOVT 320 Public Opinion and Public Choice (III) (SBA)
Spring. 4 credits. Prerequisite: GOVT 111 or permission of the instructor. W. Mebane.
A fundamental paradox of democracy is that a government that the people control will only rarely be a government that does what the people want. This is not to say that government NOT by the people is better (it is usually worse). This course explores this problem, contrasting the answers given by the concept of public opinion and the formal theory of social choice. We encounter the paradox in several American political institutions, including elections, legislatures, and bureaucracy.

GOVT 327 Civil Liberties in the United States (also AM ST 310) (III) (KCM)
An analysis of contemporary issues in civil liberties and civil rights, with emphasis on Supreme Court decisions. Cases are analyzed in terms of democratic theory and the social and political context in which they arose.

GOVT 328 U.S. Supreme Court (III) (HA)
Fall. 4 credits. J. Rabin.
The course investigates the role of the Supreme Court in American politics and government. It traces the historical development of constitutional doctrine and the institutional role the court has played in American politics.

GOVT 329 Comparative Politics of Latin America (III) (SBA)
Fall. 4 credits. M. Anner.
This course explores major themes in Latin American politics such as development and dependency, authoritarianism, and democratization and neoliberalism. Students examine competing theoretical approaches to these political phenomena, including sociological, institutional, and political-cultural explanations. Special attention is placed on the experiences of Brazil and Argentina, El Salvador and Nicaragua, and Mexico and Cuba.

GOVT 354 Capitalism, Competition, and Conflict in the Global Economy (III) (SBA)
Unemployed autoworkers in Detroit and the wood stoves in New England signal an important change in America’s relation to the world economy. This course characterizes these changes in a number of fields (trade, money, energy, technology), explains them as the result of the political choices of a declining industrial power that differs substantially for the choices of other states (Japan, Germany, Britain, France, the small European states, and Korea), and examines their consequences for America and international politics.

GOVT 403 International Environmental Policy and Law (III) (SBA)
Transboundary environmental problems require a coordinated supranational response. Coordinating this response can be called “global governance.” Global governance is not world government nor is it simply international relations. During this course, students will examine global governance and international cooperation regarding selected regional and international environmental issues. The course lays the foundation for understanding international environmental law, its concepts, sources, and applications. Students will learn how to identify the various coordinating mechanisms, including environmental treaties and agreements, are initiated, negotiated, and implemented. Also, students will explore the role of institutions, regimes, laws, states, non-state actors, science, and ideas in relation to environmental policy coordination at the global level. The class will discuss global environmental issues within the context of international relations theories, methods, and ideas. We will discuss such concepts as North-South political divisions, power, sovereignty, security, legitimacy, globalization, ethics, conflict, and cooperation as they are played out in one specific issue area. Students will gain exposure to theoretical and empirical approaches to international environmental politics and to qualitative and quantitative research strategies. There will be some lecturing, but the majority of class time will be devoted to discussion, debates, and student presentations.

GOVT 404 American Political Development in the Twentieth Century (also AM ST 404 and GOVT 612) (III) (HA)
Fall. 4 credits. E. Sanders.
This course examines the growth and character of the American national state in the early twentieth 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 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 405 The Postmodern Presidency: 2004 (also AM ST 430.3) (III) (CA)
This course will examine the presidencies of Reagan, Bush, and Clinton in relation to such scholars as held the “postmodern presidency.” The term has been used by institutionalist scholars of the presidency as
a periodizing hypothesis, our emphasis will be on the work of cultural critics and historians. We will address the slippage 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 Kennedy assassination will serve as a case study in the formation of a national icon. 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. As this is a presidential election year, we will examine popular representations of Campaign 2004.]

[GOVT 408 Politics of the American Civil War (also AM ST 430.1) (III) (HA)
R. Bennett.

GOVT 419 Coordination in American Politics (also GOVT 613) (III) (SBA)
Spring. 4 credits. Prerequisites for undergraduates: GOVT 111 and one 300-
level course in American government, or permission of the instructor: W. Mebane.
In this seminar we examine the idea that American voters act in a strategically
coordinated way. Are voters as wary of one another as they are of politicians? We examine how coordination depends on American institutions, especially the separation of
powers and the political parties. We look at how large-scale coordination, which implies
collective equilibrium, need not depend on individuals being highly informed and
rational. We consider how coordination and strategic voting affect the parties' campaign
strategies, and what coordination implies about popular control of the government.

GOVT 420 War at Home (also AM ST 422) (III) (HA)
Fall. 4 credits. M. Shaffer, J. Rafkin.
This seminar examines how American governments have been shaped by the nation's wars over the past several decades—from World War II to the Second Gulf War. We will analyze and compare how these wars influenced U.S.
constitutional law, major institutions of U.S. government, American electoral politics, and ongoing conflicts among important political
constituencies.

GOVT 424 Contemporary American Politics (also GOVT 629)
Spring. 4 credits. M. Shaffer.
This seminar analyzes some major changes in U.S. electoral and group politics in recent
decades. Topics to be considered include: partisan realignment, the new conservatism,
racial cleavages, "identity politics," and democratic decline.

GOVT 426 Colonialism and Post
Colonialism (also GOVT 625) (III) (HA)
Spring. 4 credits. L. Ryter.
The age of colonialism, for the most part,
came to an end after the second world war. Yet colonies profoundly shaped the world we know today, transforming economies, geographies, identities, and epistemologies. Students of "developing countries" in particular must consider colonial legacies, not only to understand how they have
shaped the objects of study, but also how they have structured the very methods and modes of analysis brought to bear on the objects themselves. Aimed to explore the
various dimensions of "postcolonialism," this course will survey such topics as colonial
empires, nationalism and colonization, commodities and violence, and representation and
subjectivity. Readings will be drawn from the scholarship in several disciplines, from
anticolonial writings, and from colonial genres such as travelogues.

[GOVT 427 Immigrants, Membership, and Citizenship (also LSP 430.4) (III) (CA)
M. Jones-Correa.
Immigrants are increasingly important players in the politics and economies of
industrialized societies. However, in many cases despite their residence in these societies, their membership and citizenship status is often in question. At times migrants are
undocumented, living and working at the fringes of the protections and regulations afforded by the legal system. Or they may
petition to enter as refugees, having to prove their eligibility. If residing permanently, immigrants may still not be
citizens of their receiving country, or if they are, they may have dual nationality.
This course explores the complications of membership and citizenship among migrants, refugees and immigrants, focusing largely on immigration to the United States.]

[GOVT 428/728 Government and Public
Policy: An Introduction to Analysis
and Criticism (III) (SBA)
T. J. Lovel.
GOVT 428 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.

[GOVT 429 Government and Public
Policy: An Introduction to Analysis
and Criticism (III) (SBA)
Spring. Open to undergraduates. 428 and consent of instructor are required for 429.
T. J. Lovel.
GOVT 429 is an opportunity to pursue further the research begun in 428.]

Comparative Government
GOVT 131 is recommended.

GOVT 226 Sophomore Seminar: Empires
Fall. 4 credits. V. Bunce.
In this seminar we compare the politics, economics, and culture of empires, with
particular emphasis on historical empires, such as the Ottoman and Habsburg, and more
recent empires, such as the Soviet bloc and (it can be argued) the United States after
the end of the Cold War. Among the questions we will debate are the following: What
is an empire, and what makes it different from a state? Why do empires rise, why do
they fall, and how do these processes affect international and domestic politics, economics
and culture? Finally, how are empires experienced—especially for colonial people?
Four short papers, all based on the readings, are required.
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 outstanding, meaningful, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

GOVT 330 Politics of the Global North (also ILRIC 333) (III)
Fall. 4 credits. L. Turner.
For a description, see ILRIC 333.

GOVT 332 Modern European Politics (III)
(SBA)
Spring. 4 credits. H. Zimmermann.
The course gives an introduction to politics and political systems in Western Europe. It starts with a brief history of the formation of the nation state and the establishment of democratic rule. It continues with the modes and structures of political conflict and explores political cultures, party and electoral systems, the roles of interest groups and social movements, and the mass media. It then turns to a discussion of parliament and government. The main countries studied include Britain, France, Germany, and Italy. The main dimensions guiding the comparison are conflict vs. consent, federalism vs. centralism, parliamentary vs. presidential systems, and majority vs. proportional representation. The course concludes with a discussion of minority-majority relations and the problem of democratic inclusion.

GOVT 336 Postcommunist Transitions
(III) (SBA)
V. Bunce.
This course comprises economic and political developments since the collapse of communism in Eastern Europe and the former
Soviet Union. Primary emphasis is placed on the relationship between democratization and the transition to capitalism, with some attention paid as well to nationalism and (for the new states in the region) state-building.
Cases examined in greatest detail vary by year, but are always multiple so as to encourage comparative observations and generalizations.

GOVT 337 Militaries, Societies, and
Rogues
Fall. 4 credits. L. Ryter.
How do we understand the relationship between militaries and societies? Do powerful
militaries protect democracy or oppose it? Many argue that democracy depends on
civilian control of the military. Where do private militias, paramilitaries, and so-called
"rogue elements" within military hierarchies themselves fit in? This course will raise
such questions through a critical review of selected literature in civil–military relations and’Brien’s work on discourse communities.
Course readings will be drawn from these literatures, as well as from political theory, anthropology, and
history. We will consider cases from Southeast Asia, Latin America, and Africa in comparative
historical perspective.

GOVT 338 Comparative Political
Economy (III) (SBA)
J. Pontusson.]
GOVT 339 Political Economy of Development
Spring. 4 credits. D. Moehler.
This course examines the political economy of developing countries. It addresses the question: What is development? How have our ideas about development and its causes changed over time? How have the experiences of people living in developing countries improved or worsened? Where should we focus our development efforts in the future? The first half of the course surveys major theories over the past fifty years about how states develop economically and politically. The second half examines some current development issues.

GOVT 341 Modern European Society and Politics (also SOC 341) (III) (SBA)
Spring. 4 credits. S. Tarrow.
Since the French and industrial revolutions, modern Europe has been the major source of innovation and stability, freedom and impenetrable borders. This course serves as an introduction to European society and politics. Topics include European state-building and capitalism, nationalism and socialism, cycles of revolution and reaction, stratification and mobility, law and violence, and war and democracy. The course ends with an introduction to the European Union and its conflicts. May be taken separately or in combination with GOVT 342, The New Europe, which focuses on contemporary European Union. If qualified student interest permits, a section may be offered in French or German.

GOVT 343 The Politics of European Integration (III) (SBA)
Fall. 4 credits. H. Zimmermann.
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. We will also explore how European integration is reshaping domestic political and economic conditions in the member states of the European Union and current debates about the emerging European polity. The implications of Eastward enlargement for the EU, for the emerging market economies of Eastern Europe and for the process of Europeanization will be considered in some depth.

GOVT 344 Government and Politics of Southeast Asia (III) (HA)
Spring. 4 credits. L. Ryten.
Contemporary politics in Southeast Asia must be understood in the light of colonialism, the nationalism movements that colonial rule in effect produced, and the geo-strategic imperatives of the Cold War. Colonial rule defined the territorial boundaries and institutions of the modern state, nationalism provided a new political discourse, and the Cold War helped determine the nature of authority in post-colonial states. This course will consider these and other themes in comparative perspective with special focus on Indonesia, Thailand, and the Philippines.

GOVT 347 Politics of China (III) (HA)
Spring. 4 credits. Not offered 2004–2005. This course is designed to provide a comprehensive introduction to the main issues in Chinese politics in the twentieth and twenty-first centuries. The first sessions of the class focus on the rise of the Chinese revolution, the tenants of Mao Zedong thought, and the main political campaigns of the Mao period. Next, the course focuses on the Deng Xiaoping and Jiang Zemin eras and the complex problems associated with “opening” China. Some of these problems include reforming the economy incrementally while furthering economic growth, rectifying the fallout of political extremism and expanding individual choice while keeping society stable and affirming collective interests, and allowing more input into policy processes while maintaining party dominance. Students examine the succession of a new generation of leaders to power, a fourth generation, and the possibility of continuing economic and political reforms. We also make comparisons between the People’s Republic of China and Taiwan. Throughout the course, we explore several themes including the meaning of citizenship in a one-party-dominated state, national integration, state power and regime adaptation, challenges of democratization, and the political challenge of social issues.

GOVT 353 Recent East Asian Politics (III) (HA)
Fall. 4 credits. Prerequisite: GOVT 111 or permission of the instructor. Not offered 2004–2005.
A fundamental paradox in democracy is the fact that a government the people control will only rarely be a government that does what the people want. This is not to say that government NOT by the people is better, for it is usually worse. This course explores this problem, contrasting the answers given by the concept of public opinion and the formal theory of social choice. We encounter the paradox in several American political institutions, including elections, legislatures, and bureaucracy.

GOVT 354 Capitalism, Competition, and Conflict in the Global Economy (III) (SBA)
Unemployment figures in Detroit and the hollowed out neighborhoods in the member states of the European Union and current debates about the emerging European polity. The implications of Eastward enlargement for the EU, for the emerging market economies of Eastern Europe and for the process of Europeanization will be considered in some depth.

GOVT 355 Model European Union I
Spring. 2 credits. Staff.
This two-credit course is designed to prepare students to participate in the annual Model European Union Simulation held, on an alternating basis, at S.U.N.Y.—Brooklyn and in Brussels. The simulation provides an opportunity for participants, representing politicians from the member states of the European Union, to discuss issues and resolutions of current concern to the E.U. The preparatory course introduces students to the E.U., the countries that the Cornell team will represent, and the issues to be discussed at the simulation. A substantial part of travel costs for the Cornell team will be paid by the Institute for European Studies, and course enrollment will be restricted by budgetary considerations. Students enrolled in this course are required to write a research paper.

GOVT 356 Environmental Politics and Policy (III) (SBA)
A research-oriented seminar oriented toward theoretical understanding of the intersection of social and natural systems as mediated by the state. Readings and examples will come from both rich and poor societies. Specific topics will include the “tragedy of the commons,” biodiversity, international accords affecting the environment, and various models of political behavior and the translation of political movements into public law.

GOVT 357 Contemporary China: Society and Politics @ (III) (SBA)
Selected reading and in-class discussion of some of the central dilemmas that have been posed by the rapidly escalating processes of social change taking place under conditions of continuing authoritarianism in China today. Topics include: rapid economic growth and social structure; rising tensions in family and gender relations; the enduring salience of community and workplace; the resurgence of Chinese nationalism, of ethnic nationalisms, and of popular religious movements; the significance of rising rates of crime and of political corruption; the growing crisis of social welfare delivery; and the limits on political dissent and on the development of civil society.

GOVT 358 Japanese Politics (also ASIAN 358) @ (III) (SBA)
Fall. 4 credits. R. Weiner.
Japanese politics in comparative perspective, with special focus on the “lost decade” years from the early 1990s to the present. Topics to include historical foundations; political parties and elections; legislative politics; rationalism; the bureaucracy; social welfare, immigration, labor, industrial, and general economic policy; foreign relations; non-government organizations and civil society, law and politics; and/or others according to student interest.

Political Theory
GOVT 161 is recommended.

GOVT 274 History of the Modern Middle East in the Nineteenth and Twentieth Centuries (also HIST 276, JWST 274, and NES 274)
Spring. 3 credits. M. Campos.
For description, see NES 274.

GOVT 293 Inequality, Diversity, and Justice (III or IV) (KCM)
Spring. 4 credits. R. Miller.
For description, see PHIL 193.

GOVT 294 Global Thinking @ (III) (KCM)
Spring. 4 credits. H. Shue.
Existing nation-states face many challenges that cross their borders, including environmental degradation, international
This course considers the possibility and desirability of a world government. Students will evaluate the practical achievability of different world-level political structures, paying particular attention to contemporary theories of international relations, and to related questions of social-scientific evidence. Students also will evaluate the ethical status of potential world-level political structures, evaluating the normative value of existing states compared to the likely dangers and benefits of several visions of world government.

[GOVT 360] Ideology (III) (CA)

This course focuses on critical approaches to the study of ideology in order to understand the role of ideology in political subject formation. After an initial exploratory presentation of key Marxist (Marx, Gramsci, Althusser), Heideggerian-structuralist-semantic (Barthes, Eco) and psychoanalytic models (Freud, Lacan), we focus on specific ideologies of race, technology and gender. Students are required to write a 7–8 page take-home exam and a longer 10–12 page (double spaced) paper related to the issues addressed by the course material. A recommended bibliography is available to assist in the selection of the final paper topic.

[GOVT 361] Liberalism and Its Critics (III) (KCM)
Fall. 4 credits. B. Hendrix.

The term "liberalism" refers to a broadly allied set of political theories and practices that focus on maximizing individual liberty, generally through the protection of personal rights. This course will consider both competing views within the liberal tradition, and challenges made by those outside it. The course begins with the historical origins of liberalism in European religious wars and changing coalitions of power, and moves forward through its major theorists to the present day.

[GOVT 362] Modern Political Philosophy (also PHIL 346) (III or IV) (KCM)
Fall. 4 credits. R. Miller.

For description, see PHIL 346.

[GOVT 363] Politics and Culture (III) (HA)
Fall. 4 credits. M. Berezin.

For description, see SOC 248.

[GOVT 364] Politics of Nations Within (III)
Spring. 4 credits. B. Hendrix.

This political-theory course will consider the political status of Native Americans in the United States, as well as the status of indigenous peoples in Canada, Australia, and New Zealand. We will begin with brief overviews of native peoples in the countries concerned and essential attention to the history of their interactions with the states that now rule them, and their contemporary legal status. The course will consider the ideologies used to justify conquests and displacements by European colonizers, particularly as illustrated in historical works of political theory and key court cases. The latter half of the course will consider the possible futures of these "nations within" by considering normative arguments about assimilation, cultural rights, treaty federalism, and full sovereign statehood.

[GOVT 366] American Political Thought from Madison to Malcolm X (also HIST 316 and AM ST 356) # (III) (HA)

A survey of American political thought from the eighteenth century to the present. Particular attention is devoted to the persistence of liberal individualism in the American tradition. Politicians, pamphleteers, and poets provide the reading. Insightful historical and social context is offered.

[GOVT 376] Writing in the Majors

This course is specifically designed for students enrolled in GOVT 366/AM ST 376/HIST 316 opting to take the extra one credit.

[GOVT 368] Global Justice (also PHIL 347) (III or IV) (KCM)
Spring. 4 credits. B. Miller.

On-going international negotiations under the Framework Convention for Climate Change, adopted to deal with global warming, are producing conflicts between rich and poor states and between industrial and oil consumers about who ought to bear which proportion of the costs of any economic changes necessary either to slow the predicted rate of climate change or to adapt to rapid changes. What, if any, cooperative deal with a common but long-term threat? This course critically examines a variety of views about international and intergenerational justice.

[GOVT 370] Political Theory and Cinema (also GERST 330, COM L 330, THETR 330) (III or IV) (CA)

For description, see GERST 330.

[GOVT 375] Visual Culture and Social Theory (also ART H 370, COM L 368, VISST 367) (III or IV) (CA)
Fall. 4 credits. S. Buck-Morss.

Introduction to critical concepts for the study of visual culture in specific socio-historical contexts. The course deals with the intersection of art and politics in the twentieth century. Empirical cases (from the USSR, Europe, the United States, and Latin America) are used to examine such theoretical issues as the human sensorium; the meaning of aesthetics, images and the political imagination; art for the masses, vanguard and avant-garde; the political implications of style (fascism, socialism, liberalism, nationalism); the impact on art of the technical reproduction of the image; form vs. content; the political claims of contemporary practices (feminist, modernist, conceptuelist, site-specific); the art world after the "end of art." Central attention will be given to the theoretical writings of Walter Benjamin.

[GOVT 377] Concepts of Race and Racism (III) (CA)

This course examines race and racism from a political theory perspective. We discuss the different types of racism: traditional racism, "new racism" or cultural racism, scientific racism and contemporary hybrid racism. We then examine the politically ambiguous "ethnicity theory." In the second half of the course, we consider the works by Marable on African American political economy; women of color feminist theorists; native American theorists; Takaki on Asian American labor history; and Hero on Latinos/Latinas and American politics. Although we discuss American multicultural history in some detail, our primary focus is on an investigation of these works' theoretical foundations.

[GOVT 460] Justice Toward Indigenous Peoples (III) (KCM)

This course will examine the status of indigenous peoples in the United States, Canada, Australia, and New Zealand from a comparative perspective. The course will deal with ethical questions surrounding land restitution, language rights, and political autonomy, as well as considering the possibility of full sovereign statehood.

[GOVT 465] Reconciling Liberalism and Socialism (also PHIL 447) (III or IV)

For description, see PHIL 447.

[GOVT 466] Topics Pol Phil: Islamism @ (III)
Spring. 4 credits. Open to graduate students and juniors and seniors who have taken GOVT 161. A 300-level course in political theory. S. Buck-Morss.

Topics vary, but all analyze texts written by non-European and non-U.S. theorists who have inspired modern political and social movements. Attention is given to the political and theoretical presuppositions embedded in the very conception of the "West," the hegemony of its political discourses, and how these figure into the meanings of "modernity," "progress," "universal rights," and "liberation." In fall 2002 the topic will be Islamism. We will read philosophical texts by Ayatollah Ruhollah Khomeini, Hassan al-Banna, Muhammed Iqbal, Ustadh Mahmoud, Sayyid Qutb, and Ali Shariati, and commentaries by academic scholars: Mohammed Arkoun, Talal Asad, Saba Mahmood, Bobby Sayyid, Azzam Tamini, Bassam Tibi, as well as historical and social-scientific analyses of political events influenced by Islamism. (In alternate years, Latin American and Caribbean writers and social movements are the focus.)

[GOVT 470] Contemporary Reading of the Ancients (III) (CA)
Fall. 4 credits. Graduate students are welcome to enroll in the seminar. Not offered 2004–2005. D. Rubenstein.

This seminar is designed to address a dual purpose. As a general overview, it will reacquaint the student with representative texts within the classical tradition. Methodologically, it is intended to introduce different interpretative strategies (e.g. feminist, post-structuralist, deconstructive, psychoanalytic and critical-queer) involved in the contemporary revisiting of ancient political thought. More specifically, we will consider what is at stake (theoretically) in reading the ancients today. It will be argued that if we still read the classics today, it is because of the way that their texts address everyday life issues of love and friendship, food and pedagogy, eras and death. What do figures such as Aristotle, Plato, and Antigone offer to contemporary debates within modern (identity) politics concerned with the question of where self knowledge is located? What does Socratic teaching share with deconstructive or feminist inspired teachings of ignorance?"
GOVT 473 Marx, Nietzsche, Freud (also COM L 425 and GERST 415) (III or IV) (CA)
Spring. 4 credits. G. Waite.
For description, see GERST 415.

International Relations
GOVT 181 is recommended.

GOVT 182 WIM Section: Introduction to International Relations
Fall. 1 credit. Staff.

GOVT 215 Sophomore Seminar: Gender, Nationalism, and War (also FGSS 215) (II) (GA)
Spring. 4 credits. M. Evangelista.
What is the relevance of gender to nationalism, conflict, and war? The association of hostility, aggression, and bloodshed with masculinities—and conciliation and peace-seeking with female attributes—repeatedly surfaces in portrayals of militaries and violent strife. The concept of the nation is inextricably linked to images of motherhood (the motherland, the mother figurant, etc.), but violent defense of the nation has traditionally been understood as a masculine endeavor. In this course, we examine works in several disciplines and media and evaluate generalizations that link gender, nationalism, and war. Our texts include novels and films, as well as political and sociological writings. Students will read Virginia Woolf’s Three Guineas and Joshua Goldstein’s War and Gender (a political science survey). They will see films such as the Battle of Algiers and Prisoner of the Mountains—a Russian film based on the war in Chechnya, but that draws on Tolstoy’s stories, which the students will also read. Because the course emphasizes writing, students will have the opportunity to experiment with a wide range of styles, from visual analysis of the films to political research. Among the questions we explore are: How does the political formation of gender identity occur? How do gender identities shape the objectives and techniques of nationalist movements and state power and how are they deployed by the state? We will reflect on these questions both theoretically and in the visually episodic representations of violent nationalism or ethnic conflict—in the former Yugoslavia, in the Chiapas region of Mexico, in Afghanistan, and elsewhere.
This is a special seminar sponsored by the John S. Knight Institute Sophomore Seminars Program. Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the disciplines outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

GOVT 34 Capitalism, Competition, and Conflict in the Global Economy (III) (SBA)

P. Katzenstein.
Unemployed autoworkers in Detroit and the wood stoves in New England signal an important change in America’s relation to the world economy. This course characterizes these changes in a number of fields (trade, money, energy, technology), explains them as the result of the political choices of a declining imperial power that differs substantially for the choices of other states (Japan, Germany, Britain, France, the small European states, and Korea), and examines these consequences in America and international politics.

GOVT 380 The Politics of Modern Germany (III)

GOVT 381 Conflict and Cooperation in Trans-Atlantic Relations (III) (SBA)
H. Zimmermann.
This course evaluates changes over time in political and economic relations between the United States and Western Europe (including the European Union), beginning with the Cold War and continuing to the present. The key issue will be explaining patterns of cooperation and conflict.

GOVT 383 The Cold War (III) (HA)
M. Evangelista.
During more than four decades following the end of World War II international politics was dominated by a phenomenon known as the Cold War. This class examines the origins, course, and ultimate demise of this conflict that pitted the United States and NATO against the Soviet Union and its allies. It seeks to evaluate the competing explanations that political scientists and historians have put forward to explain the Cold War by drawing on the new evidence that has become available. The course considers political, economic, and strategic aspects of the Cold War, including the nuclear arms race, with particular focus on the link between domestic and foreign policy in the United States and the Soviet Union. The course emphasizes writing and includes a final research paper for which students will use original archival materials.

GOVT 384 Contemporary International Conflicts (III) (SBA)
J. J. Suh.
This is a survey of contemporary international conflicts. After a brief review of theoretical literature on the causes of conflict/war, we address some of the more salient international security issues such as proliferation of weapons of mass destruction, missile defense, civil wars, and ethnic conflicts. We also critically evaluate whether the use of force or outside intervention is helpful in mitigating the contemporary conflicts.

GOVT 385 American Foreign Policy (III) (SBA)
Spring. 4 credits. J. J. Suh.
This course provides an overview of the history of American foreign policy, concentrating on the period between 1914 and the present. Various theoretical approaches to the study of American foreign policy are covered, including international, domestic, and individual levels of analysis. These interpretations are used to examine events including: the First World War and the League of Nations; the rise of American hegemony; various crises of the Cold War, including the U-2 crisis, the Suez and Berlin crises, and the Cuban missile crisis; and the Korean, Vietnamese, and Gulf Wars. Emphasis is placed on security as opposed to economic foreign policy issues.

GOVT 386 The Causes of War (III) (SBA)
C. Way.
This course 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 be more willing to use force “rallying around the flag” in support of their governments? Does the inexorable pattern of the rise and fall of national leaders lead to cycles of dynamism and then periods of dormancy? These and other questions will be examined in our survey of theories of war at three levels of analysis: the individual and small groups, domestic politics, and the international system. Topics covered include 1) historical patterns in warfare; 2) theoretical explanations for war; 3) evaluation of the evidence for the various explanations; 4) nuclear weapons; 5) ethics and warfare; and 6) the major security problems of the coming decades, civil war, and the prospects for peace in the future.

GOVT 389 International Law (III)
Fall. 4 credits. Taught in Washington, D.C.
Is international law a pious delusion, helpless in the face of real power? Or is it a 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.

GOVT 393 Introduction to Peace Studies (III) (SBA)
Fall. 4 credits. M. Evangelista.
This course serves as an introduction to the study of war, peace, and peacemaking. We will study different interpretations of peace and war from a variety of disciplinary perspectives. The course will cover definitions of peace and war, causes of conflict, and modes of conflict prevention and resolution. The concepts will be applied to a range of historical and current conflicts. Students will prepare analyses of specific conflicts or instances of peacemaking for class presentation.

GOVT 395 New Forces (Actors and Issues) in International Politics (III) (SBA)
A. Carlson.
How important are regional groupings, non-governmental organizations, narco-terrorists, ethnic groups, and transnational environmental issues within international politics? These forces seem to be occupying an increasingly central position in the international arena, yet the factors that have caused their rise, the degree to which they have transformed the face of international politics, are still poorly understood. In this course we address such issues through exploring how students of international politics have described and explained the emergence of these new
forces in the international system during the post–Cold War period. In short, the course focuses on determining the extent to which we are witnessing a transformation of the international political system, and why such a change is (or is not) taking place.

GOVT 397 Israeli–Palestinian Conflict @ (III) (H)  
Fall. 4 credits. T. Sorek.
For description, see NES 397.

GOVT 480 Politics of '70s Films  
Spring. 4 credits. J. Kirshner.
The ten years from 1967 to 1976 were an extraordinary period in the history of American politics and in the history 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.

[GOVT 481 Democracies in the International System (III)  
Fall. 4 credits. Not offered 2004–2005.]

[GOVT 482 Unifying While Integrating: China and the World (also GOVT 682) @ (III) (HA)  
A seminar for advanced undergraduate and graduate students focusing on the Cold War in East Asia. The course will discuss the grand strategy of the superpowers in Asia and explore connections between the Cold War in Europe and Asia. Topics for discussion will include U.S. and Soviet policies toward China in the late 1940s, the Korean War, the role of Japan in American grand strategy, the development of the Sino-Soviet alliance and rift, military crises in Indochina and the Taiwan Straits, the Vietnam War, Sino-American and Sino-Soviet Rapprochement, and the rise of Japan and the NICs as regional economic powers. The course will conclude with a discussion of the regional implications of the end of the Cold War and recent Chinese economic growth.]

[GOVT 483 The Military and New Technology (also STS 483) (III) (SBA)  
Military organizations are seen paradoxically as both inflexible, hide-bound institutions and avid proponents of new technology. In this seminar we examine changes over time in the attitude of the military toward new technology and analyze competing explanations, including concepts from science studies, for these changes. The course concludes with an analysis of the so-called "Revolution in Military Affairs." Readings include John Ellis, The Social History of the Machine Gun, and Steven Rose-Innes, Arcing the Next War.]

[GOVT 487 Asian Security (also GOVT 687) @ (III) (SBA)  
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 is 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 ask students to challenge the linguistic and theoretical security studies through considering the importance of new actors and issue areas within the region. In short, while the seminar has a regional focus on east Asia, it is framed within the broader literature of the field.]

GOVT 490 International Institutions (also GOVT 690) (III) (SBA)  
Fall. 4 credits. J. J. Suh.
This is a study of the ways in which units in the international system are constituted and how their interactions are institutionalized. We examine not only formal international organizations that have formal decision-making rules and culpable entities, but also "settled practices" that legitimate certain actions and de-legitimize others. We develop our theoretical understanding of international institutions by analyzing such issue areas as decolonization, human rights, the environment, and communications.

Honors Courses

GOVT 494 Honors Seminar: Thesis Clarification and Research  
Fall. 4 credits. R. Herrig.
A seminar designed to support thesis writers in the Honors Program during the early stages of their research projects. Limited to students who have been accepted into the Honors program.

GOVT 495 Honors Thesis: Research and Writing  
Spring. 4 credits. Limited to students who have successfully completed GOVT 494.

Independent Study

Independent study, GOVT 499, is a one-on-one tutorial that is arranged by the student with a faculty member of his or her choosing. GOVT 499 is 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 499 Undergraduate Independent Study  
Fall or spring. 1–4 credits.

GOVT 500 Politics and Policy: Theory, Research, and Practice (also AM ST 501, PAM 406)  
Fall, spring. Taught in Washington, D.C. Offered in Cornell in Washington Program. An intensive research and writing experience utilizing the extensive resources of Washington, D.C.

Graduate Seminars

Qualified undergraduates are encouraged to apply for seminars listed with 600 course numbers but may only register with the permission of the instructor. Students may consult the supplement that lists graduate courses, available in the department office.

Field Seminars

[GOVT 603 Field Seminar in American Politics  
The basic issues and institutions of American government and the various subfields of American politics are introduced. The focus is on substantive information and theoretical analysis and problems of teaching and research.]

GOVT 606 Field Seminar in International Relations  
Fall. 4 credits. J. J. Suh.
A 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.

GOVT 607 The Western Political Tradition: A Survey  
Fall. 4 credits. B. Hendrix.
An introduction to political theory through a reading of selected classics in political thought from Plato to Rawls.

GOVT 699 CPAs Weekly Colloquium  
Fall, spring. 1 credit. S-U only. A. Dutson.

Methodology

GOVT 601 Methods of Political Analysis I  
Fall. 4 credits. T. Mehane.
The first half of this course examines how to frame, evaluate, and compare empirical explanations in political science. We introduce several theoretical approaches that have been widely applied in political science research, including rational choice, social mechanisms, and functionalism. We discuss the differences between explanation and description, emphasizing the idea of experimental manipulation. Building on this general discussion, the second half of the course explores the distinctive methodological issues involved in comparing macro-social units and surveys a range of different approaches to comparative analysis.

GOVT 602 Methods of Political Analysis II  
Spring. 4 credits. N. Winter.
This course provides an introduction to some of the quantitative methods used in the social sciences. Topics discussed include elementary probability theory, random variables, functions of random variables, and sampling distributions, concepts of inference, including point estimation, confidence intervals, and hypothesis testing; bivariate regression; and multiple regression.
GOVT 603 Field Seminar in American Politics
Spring. 4 credits. M. Jones-Correa.
The basic issues and institutions of American government are introduced. The basic focus is on substantive information and theoretical analysis and problems of teaching and research.

[GOVT 605 Comparative Methods]
J. Pontusson.
This seminar provides a survey of different methodological approaches to the study of comparative politics: single case studies, comparative case studies based on Millian logic, qualitative comparative analysis, and a variety of quantitative methods. Substantive works are used to illustrate each approach. Throughout, the discussion emphasizes methodological issues that are common to all forms of comparative inquiry.

American Government and Institutions
GOVT 611 The Political Economy of American Development, 1860–1900
Spring. 4 credits. R. Bensel.
This course traces and describes the political economy of national state formation from the last decades of the antebellum period, through the Civil War and Reconstruction era, and ends with the transition to a more industrial society during the late nineteenth and early twentieth centuries. Using a broad survey of the historical literature on these periods, the course investigates: 1) the connection between slavery and the emergence of southern secession; 2) the impact of conflict between the plantation South and industrializing North on American state formation; 3) the failure of post-Civil War attempts to remold the southern political economy; 4) the role of finance capital markets in industrial and western agrarian expansion and the consequent emergence of monetary issues in national politics; and 5) the political economic basis of possible developmental trajectories other than the high-tariff, gold-standard one actually followed.

GOVT 612 American Political Development in the Twentieth Century (also AM ST 404 and GOVT 404)
Fall. 4 credits. E. Sanders.
For description, see GOVT 404.

GOVT 613 Coordination in American Politics (also GOVT 413)
Spring. 4 credits. W. Mebane.
In this seminar we examine the idea that American voters act in a strategically coordinated way. Are voters as wary of one another as they are of politicians? We examine how coordination depends on American institutions, especially the various subfields of American politics are introduced. The focus is on substantive information and theoretical analysis and problems of teaching and research.

[GOVT 620 The United States Congress]
Fall. 4 credits. R. Bensel.
The United States Congress is examined, first, as a "closed system" in which institutional arrangements decisively apportion political power; and, second, as the product of electoral and social forces outside the institution. Emphasis is placed on the historical relationship between institutional growth and state formation, parliamentary rules as both arrangements within which the "rational choices" of legislators are played out and as determinants of policy allocations and allocations of political influence, and the use of legislative behavior as evidence in the analysis of fundamental principles of politics. Because the literature on the lower chamber is generally richer, the House of Representatives receives greater attention than the Senate.

GOVT 629 Contemporary American Politics (also GOVT 424)
Spring. 4 credits. M. Shifter.
For description, see GOVT 424.

GOVT 703 Political Economy
Fall. 4 credits. J. Kirshner.
This course undertakes a general survey of the classical and modern theories of political economy. The works of Smith, List, Marx, Weber, Keynes, Smilpeter, Hayek, and Friedman, among others, are studied and placed within the context of the history and evolution of the thought, practice, and method of the field.

[GOVT 728 Government and Public Policy]
T. J. Lowi.
For description, see GOVT 428.

Comparative Government
GOVT 625 Colonialism and Post-Colonialism (also GOVT 426)
Spring. 4 credits. L. Ryter.
For description, see GOVT 426.

[GOVT 626 Comparative Political Economy]
J. Pontusson, R. Herring.
Every society necessarily authorizes mechanisms to anchor economic questions: what is to be produced? how is it to be produced? how is it to be distributed? and so forth. Answers may include customary arrangements, markets, or state institutions, typically some composite of these. Both the choice of mechanisms and the dynamics generated by such choices are ultimately political. The mix of choices varies across regions, nations, and sectors, as well as over time. Such choices are both affected by and affect parallel choice politics of the international economic system and by powerful actors and ideas operating on a global scale. Utilizing the great debates about economic change in relatively less industrialized as well as more advanced societies, we seek to understand the political economy of development.

[GOVT 639 Comparative Political Participation]
D. Mohler.
This seminar on comparative political participation examines the causes, consequences, and forms of public participation throughout the world. Much of the existing research on political participation comes from the study of American politics. Students will be encouraged to read these as case studies, with the goals of extracting hypotheses that can be tested in other contexts and revising theories to fit a broader set of cases. As much as possible, the readings will incorporate studies of participation from other developed democracies, developing democracies, and even non-democracies. Topics will include individual level predictors of participation; the role of elite mobilization and social ties; culture and political behavior; political attitudes and public opinion; how institutions and contexts affect political behavior; and the effects of participation on individuals and the system.

[GOVT 641 Revitalizing Labor: A Comparative Perspective (also ILRIC 632)]
For description, see ILRIC 632.

[GOVT 645 Chinese Politics]
Spring. 4 credits. Not offered 2004–2005. Review and assessment of several of the major currently competing approaches to the study of Chinese politics. Discussion and evaluation of leading works in the field analyzing Chinese state and society, policymaking and policy implementation, bureaucratic politics, elite politics, political culture, and political economy. Special attention to problems of research and interpretation.

[GOVT 647 Criminality and the State]
Criminality has been approached in the social sciences from a variety of angles. Following Durkheim we have viewed crime as a social anomie. Criminal theorists following Foucault have understood criminality as an integral and functional part of the social system. Comparative politics has tended to approach criminality from above, viewing, for example, as an indicator of the relative degree of institutionalization of legal systems. Meanwhile, empirical studies of post-colonial states (in particular but not exclusively) suggest a problematic indeterminacy between state authorities and criminals. State officials and institutions may act criminally with impunity (corruption) while criminals may act on behalf of state officials (contracted extra-judicial political violence). This seminar will examine the relationship between criminality and the state, mostly in post-colonial contexts, drawing from interdisciplinary theoretical literatures as well as area-specific empirical studies, literature, and film. Although we focus largely on cases in Southeast Asia, where there is an emerging literature on criminality and the state as well as empirical studies, graduate students with
other area knowledge are encouraged to bring their materials to the seminar discussions.

**GOVT 657 Comparative Democratization**
Fall. 4 credits. V. Bunce, D. Moehler.
This course focuses on the transition from authoritarian to liberal politics in Eastern Europe and Latin America. Particular attention is paid to Poland, Hungary, and Russia as well as Argentina, Brazil, and the not-necessarily-transitional Mexico. During the course, we also bring in a variety of other case studies of democratization—in particular, Spain, Portugal, Italy, and Greece. Our focus is divided equally between the empirics of these transitions and theoretical understandings of transitions to democracy.

**GOVT 660 States and Social Movements (also SOC 660)**
Fall. 4 credits. S. Tarrow.
Two traditions run parallel in political sociology and comparative politics: the study of statebuilding and state transformation and the study of social movements and contention. 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 the 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.

**GOVT 706 Labor in Global Cities**
Fall. 4 credits. L. Turner.
For description, see ILRKB.

**GOVT 707 Game Theory for Political Science**
Fall. 4 credits. R. Weiner.
Introduction to game theory, with applications to comparative politics, American politics, and international relations. We will study basic concepts of game theory: how to formulate, solve, and empirically test simple games; and how to assess game-theoretic argumentation in the literature of political science.

**GOVT 735 Politics of South Asia**
Spring. 4 credits. R. Herrick.
This course investigates the politics of the South Asian region by examining the substantive and theoretical literature on various specific subjects, with special emphasis on India. Themes will vary by term, but will include some mix of political economy and development, agrarian movements and policy; politics of ethnicity, identity, and subnationalism; and environmental politics. An explicit focus is comparative method, both within the region and between the region and other world areas. The course is seminar in format and premised on significant student participation.

**Political Theory**

**GOVT 661 Secession, Intervention, and Just War Theory**
Fall. 4 credits. B. Hendrix.
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 focuses on the discussion of secession, while the second half investigates intervention and war. Central texts include Allen Buchanan, *Secession; David Miller, On Nationality; and Michael Walzer, Just and Unjust Wars*.

**GOVT 664 Democratic Theory**
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.

**GOVT 666 Media Theory: Film and Photography**
Fall. 4 credits. D. Rubenstein.
This seminar will focus on what Mary Ann Doane has called "epistemologies of racial and sexual difference" in cinema and photography. It will examine psychoanalytic and feminist models of identificaiton, such as Laura Mulvey, Mary Anne Doane, Jacqueline Rose, and Hélène Cixous, as well as more recent work by Paul Virilio, Guy Debord, Jonathan Crary (and Michel Chion). These critical and theoretical interests will be reframed in relation to canonical texts on photography (Walter Benjamin, Roland Barthes, Pierre Bourdieu).

**GOVT 670 Graduate Seminar: European Cultural and Intellectual History**
Spring. 4 credits. M. Steinberg.
For description, see HIST 605.

**GOVT 670 Modern Social Theory II (also GERST 670)**
Topics vary. The title for spring 2004 was: "Towards a New Aesthetics: The Politics of Perception in a Global Field." This is a cross-disciplinary seminar in visual studies. The visual is approached not only as content, but as method. Topics will include "Aesthetics I" (Kant, Arendt); "Aesthetics II" (Simmel, Benjamin); and "Toward a New Aesthetics," that allows us to consider "Globalization as an Aesthetic Field."

**GOVT 672 Postcolonial Political Thought**
Fall. 4 credits. K. Mantena.
How do concepts of freedom and domination, equality and liberty, and nationalism and identity look from outside Europe and North America? This course considers issues by considering two of the twentieth century's most influential, non-Western thinkers—Mohandas Gandhi and Frantz Fanon. We will also examine the contribution of contemporary theorists working in the field of postcolonial theory to these questions and concerns.

**[GOVT 674 Theory and Practice of Nationalism**
This course is devoted to the comparative study of the rise and transformation of nationalism, according to different theoretical and philosophical traditions. The relationship of nationalism to questions of race, gender, class, and time is also discussed on the basis of both theoretical and empirical studies.

**GOVT 677 Language and Politics**
Spring. 4 credits. J. Frank.
This course explores the "linguistic turn" of recent political theory alongside canonical debates over the political and epistemological consequences of different philosophies of language. Writers examined include Locke, Rousseau, Nietzsche, Wittgenstein, Austin, Derrida, Butler, and Cavell.

**GOVT 679 Althusser and Lacan**
Fall. 4 credits. G. Waite.
For description, see GERST 666.

**GOVT 760 Theoretical Approaches to Ideology**
An 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 through power structures, and the ability of political agents to interrupt institutionalized ideologies, and the processes by which ideology penetrates and reconstructs the worldviews of the dominated. We lay the groundwork for this course by examining key texts on ideology by Marx. We trace the multiple meanings of the term in his work and their various implications. We will then explore the ways in which the study of gendered and racial discourse has transformed our understanding of ideology. We address the Freudian and Lacanian interventions in ideology studies with respect to the concepts of the unconscious and misidentification. We discuss the ways in which Adorno, Horkheimer, and Habermas have re-articulated Marx's formulations. The structuralist and post-structuralist schools will be studied with reference to Saussure, Levi-Strauss, Barthes, and Althusser. Finally, we explore the problem of institutional analysis with reference to texts from the science and technology studies and state theory traditions.

**International Relations**

**GOVT 681 Politics of Transnationalism (also SOC 686, NSIS 601)**
Spring. 4 credits. S. Tarrow.
Between the realism of traditional international relations and the constructivism of its critics, a new school of transnational politics has developed. Ranging from sociological institutionalists who examine transnational normative diffusion to students of international institutions who focus on non-state authority, to students of globalization and its discontents, scholars in this tradition examine the responses of actors in civil society to a globalizing world through their interactions with one another, with states, and with international institutions. The course traces the development of this area of research from its origins in the "old" transnational politics of the 1970s; examines critically the contributions of constructivism, sociological institutionalism, and global civil society; and proposes a model of the international system in which transnational actors—claiming to act as proxies for civil society groups—interact with states and international institutions. Particular attention is paid to the formation of transnational coalitions among social movements.
transnational advocacy networks, state actors, and agents of international institutions.

**GOVT 682 Unifying While Integrating: China and the World**


A seminar for advanced undergraduate and graduate students focusing on the Cold War in East Asia. The course discusses the grand strategy of the superpowers in Asia and explore connections between the Cold War in Europe and Asia. Topics for discussion include U.S. and Soviet policies toward China in the late 1940s, the Korean War, the role of Japan in American grand strategy, the development of the Sino-Soviet alliance and rift, military crises in Indochina and the Taiwan Straits, the Vietnam War, Sino-American and Sino-Soviet Rapprochement, and the rise of Japan and the NICs as regional economic powers. The course concludes with a discussion of the regional implications of the end of the Cold War and recent Chinese economic growth.

**GOVT 685 International Political Economy**


An 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.

**GOVT 687 Asian Security (also GOVT 487)**


For description, see GOVT 487.

**GOVT 689 International Security Politics**

Spring. 4 credits. J. J. Suh.

**GOVT 691 Normative Elements of International Relations**

Fall. 4 credits. H. Shue.

We examine selected normative elements of international affairs, divided into three interlocking clusters. First are issues about conflict, including both low-intensity military intervention and nuclear weapons. Second are questions about cooperation, especially between rich nations and poor nations. Third are debates about the authority and status of the major players in the international system: individual persons, nation-states, and international regimes. Questions considered include: is the retention by some nations of nuclear weapons morally justified? Is the world one community? Should national governments be pressured to respect individual human rights?

**Independent Study**

This course is NOT open to undergraduates. Undergraduates wishing to conduct supervised study should register for GOVT 499.

**GOVT 799 Independent Study**

Fall or spring. 4 credits.

GOVT 799 is a course of 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 chair 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.

**HINDI-URDU**

See Department of Asian Studies.

**HISTORY**


The popularity of history among Cornell students is due to its usefulness as preparation for graduate, professional, or law school and for any career that requires critical thinking and good writing; the reputation of the faculty for scholarship, teaching, and advising; and most of all, the intrinsic interest of the discipline. A wide variety of introductory and advanced courses is offered. The department is particularly strong in ancient, medieval, and modern European history; in American, Latin American, and Asian history; and in the history of science.

**Advanced Placement**

If a student passes the A.P. American and/or European History exam with a score of four or five, that student will have two options: the student can either use the A.P. credits to fulfill the Arts and Sciences course credit requirements for graduation, or take our introductory American and/or European History courses.

**The Major**

To complete the history major, a student must fulfill the requirements listed below:

Entry requirement: completion of any two History courses excluding First-Year Writing Seminars.

1) Take nine history department courses (for either 3 or 4 credits each), completing all of them with a grade of C or better.

(Courses taken for entry may count toward fulfilling the major.)

2) Of the total nine courses:
   a) four must be outside of American history and
   b) three must be in history before 1800.

Courses used to fulfill requirement (1) above may also be used to fulfill requirement (2), in respect both to (a) and (b) if applicable. A course in American history before 1800 may be used to fulfill requirement (2b), a course before 1800 in a field other than American history can be used toward fulfillment of both requirements (2a) and (2b).

3) Two of the nine courses must be seminars, of which one must be a 400-level seminar. HIST 400 may be used to fulfill this 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 the Honors Proseminar (HIST 400) during their junior year plus an additional 400-level seminar, preferably during their junior year, and complete 10 courses in history (for 3 or 4 credits each). During the second term of the sophomore year or early in the junior year, interested students should speak to a faculty member or faculty adviser 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.

Honor candidates should register in HIST 401, a seminar class in Honors Research. Any exceptions to this must be approved by the Honors Committee. HIST 401 is a four-credit seminar course that permits 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 401, 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 401 and to the student's supervisor. HIST 402 is a four-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 their 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. Two copies are due during the third or fourth week of April. In May each honors candidate is given an oral examination administered by the supervisor; examination
focuses on the essay as well as the specific subfield of history in which the student has conducted research (e.g., Periclean Athens, seventeenth-century science, nineteenth-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 examination.

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.

Course Offerings

**African History**

**American History**

**Comparative History**

**European History—Ancient European History**

**European History—Medieval, Renaissance, and Early Modern European History**

**European History—Modern European History**

**History of Science**

**Latin American History**

**Near Eastern History**

**Honors, Reading, and Research**

**Course Numbering System**

100-level courses are very general introductory courses (e.g. 151-152, 190-191) and first-year writing seminars.

200-level courses are seminars or lecture courses. Neither has prerequisites and both admit freshmen.

200-249-level seminars (which are identified by the name "seminar" in the title) are similar to first-year writing seminars, except that there is greater emphasis on subject matter and less on writing.

250-299-level lecture courses cover a relatively broad geographical area, period of time, or subject.

300-399-level courses may have specified prerequisites or deal with more specialized subjects than do those numbered 250-299. Admission of freshmen varies from course to course and is indicated in the course descriptions.

400-499 are upper-level undergraduate courses.

600-899 are graduate-level courses.

**American History**

**HIST 241 Sophomore Seminar: Riot and Revolution in Nineteenth-Century Africa: The Birth of the Modern @ (III) (HA)**


**HIST 255 The Past and Present of Precolonial Africa @ (III) (HA)**

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-nineteenth-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.

**HIST 307 West Africa and the West: 1450-1850 @ (III) (HA)**


**HIST 443 The European as Other @ (III)**


**HIST 604 The Colonial Encounter**


**American History**

**HIST 101 First-Year Writing Seminar: The Blues and American Culture**

Fall. 3 credits. Please register for this course through the First-Year Writing Seminar Program. R. Polenberg.

**HIST 103 First-Year Writing Seminar: Immigrant Experiences (also AAS 103)**

Spring. 3 credits. Sign up for this course to be literature; at other times, it has aspired to science. Certainly, the way we write history forever affects how we remember things, so it seems worth discussing our opinions about how history should be written. What can we learn from “popular” versus “scholarly” histories? Is it possible to combine a flowing narrative and a trenchant argument? What’s the difference between history and fiction? All of these questions will inform a semester-long experiment in various kinds of historical writing, from analytical essays, to biographical sketches, to sweeping narratives.

**HIST 126 First-Year Writing Seminar: Local History: Cornell University**

Fall and spring. 3 credits. Please register for this course with the First-Year Writing Seminar Program. C. Kammen.

The history of Cornell University will be explored in the context of American educational tradition. Students will consider the founders and the university’s initial phase as a radical institution. How Cornell grew and changed—and how the university mirrored society—will be explored. Readings will be drawn from discussions of the university by Carl Becker, Morris Bishop, E. B. White, and others. Students will also read commentaries by former students drawn from their letters, memoirs, and diaries. Papers will focus on Cornell’s past and on Cornell’s role students will conduct research in the university archives, in print materials, and among current Cornell students.

**HIST 130 First-Year Writing Seminar: History of the Writing of History**

Fall. 3 credits. Limited to 17 students. A. Sachs.

This First-Year Writing Seminar explores the discipline of history as a historical phenomenon, stretching from Herodotus and Thucydides to David McCullough and Natalie Zemon Davis. We’ll ask what the study of history can teach us about writing, and what the study of writing can teach us about history. In some eras, history was supposed to be literature; at other times, it has aspired to science. Certainly, the way we write history forever affects how we remember things, so it seems worth discussing our opinions about how history should be written. What can we learn from “popular” versus “scholarly” histories? Is it possible to combine a flowing narrative and a trenchant argument? What’s the difference between history and fiction? All of these questions will inform a semester-long experiment in various kinds of historical writing, from analytical essays, to biographical sketches, to sweeping narratives.

**HIST 131 First-Year Writing Seminar: Great Depression: A Global Crisis in Capitalism (also GOVT 100)**

Fall. 3 credits. Limited to 17 students. J. Smith.

How do nations and their citizens respond to the “creative destruction” that characterizes capitalism? This seminar investigates this question by focusing on the Great Depression of the 1930s, exploring how this global crisis in capitalism helped provoke different kinds of political responses from Roosevelt’s New Deal in the United States to the rise of Hitler’s Nazi regime in Germany. Readings will be short and will concentrate on primary historical documents, as well as some theoretical readings. The class will spend most of our time on improving our writing, from formulating an effective argument and evaluating its supporting evidence to producing a polished final draft. A series of related writing exercises, leading to six papers, will be required.

**HIST 153 Introduction to American History (also AM ST 103) @ (III) (HA)**

Summer and fall. 4 credits. 153 is not a prerequisite for 154. 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, antebellum reform movements, and the coming of the Civil War.

**HIST 154 Introduction to American History (also AM ST 104) @ (III) (HA)**

Summer and spring. 4 credits. 154 is not a prerequisite for 154. M. C. Garcia.

An introductory survey of the development of the United States since the Civil War.
**HIST 161 American Diversity: The Twentieth Century**
(also AM ST 110, LSP 111, and AAS 111) (III or IV) (HA)
Fall. 4 credits. M. C. Garcia and D. Chang.

**HIST 202 The Court, Crime, and the Constitution**
(III) (HA)
Spring. 4 credits. Limited to 15 students. Permission of instructor required.
R. Polenberg.

**HIST 200 The Road Trip in American History and Culture**
(also AM ST 218) (III) (HA)
Fall. 4 credits. Limited to 15 students.
F. L. Moore.

**HIST 220 Jefferson and Lincoln: American Ideas about Freedom**
(also AM ST 229 and FGSS 225) (III) (HA)
Spring. 4 credits. Preference will be given to underclassmen. Limited to 15 students.
E. Baptiste.

**HIST 229 Native Peoples of the Northeast**
(also AM ST 236) (III) (HA)
Fall. 4 credits. Limited to 15 students.
J. Parmenter.

**HIST 240 Seminar: Immigration and Ethnicity in Twentieth-Century United States**
(also AM ST 241 and LSP 239) Fall. 4 credits. Limited to 15 students. Permission of instructor M. C. Garcia. For description, see Latin American History.

**HIST 242 Religion and Politics in American History: From J. Winthrop to R. Reed**
(also AM ST 242 and RELST 242) (III) (HA)
Spring. 4 credits. Permission of instructor required. Limited to 15 students.
S. K. Moore.

**HIST 261 Introduction to Native American History**
(also AAS 213 and AM ST 213) (III) (HA)
Fall. 4 credits. D. Chang.

**HIST 264 Introduction to Asian American History**
(also AAS 213 and AM ST 213) (III) (HA)
Fall. 4 credits. D. Chang.

**HIST 266 Introduction to Native American History**
(also AM ST 241 and LSP 239) Fall. 4 credits. Limited to 15 students. Permission of instructor M. C. Garcia. For description, see Latin American History.

**HIST 208 Seminar: The Era of Franklin D. Roosevelt**
(also AM ST 208) (III)
Fall. 4 credits. Seminar designed for underclass students but open to all students. Limited to 15 students. Prerequisite: permission of instructor. Not offered 2004–2005. R. Polenberg.

**HIST 209 Seminar in Early American History**
(also AM ST 209 and FGSS 209) (III) (HA)

**HIST 211 Sophomore Seminar: Black Religious Traditions: Sacred and Secular**
(also AM ST 251 and RELST 211) (III) (HA)
Fall. 4 credits. Limited to 15 students. Letter grade only. M. Washington.

**HIST 225 The U.S.-Mexico Border: History, Culture, Representation**
(also LSP 225) (III) (HA)

**HIST 229 Jefferson and Lincoln: American Ideas about Freedom**
(also AM ST 229 and FGSS 225) (III) (HA)
Spring. 4 credits. Preference will be given to underclassmen. Limited to 15 students.
E. Baptiste.

**HIST 236 Native Peoples of the Northeast**
(also AM ST 236) (III) (HA)
Fall. 4 credits. Limited to 15 students.
J. Parmenter.

**HIST 240 Seminar: Immigration and Ethnicity in Twentieth-Century United States**
(also AM ST 241 and LSP 239) Fall. 4 credits. Limited to 15 students. Permission of instructor M. C. Garcia. For description, see Latin American History.

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S. K. Moore.

**HIST 261 Introduction to Native American History**
(also AAS 213 and AM ST 213) (III) (HA)
Fall. 4 credits. D. Chang.

**HIST 264 Introduction to Asian American History**
(also AAS 213 and AM ST 213) (III) (HA)
Fall. 4 credits. D. Chang.

**HIST 266 Introduction to Native American History**
(also AM ST 241 and LSP 239) Fall. 4 credits. Limited to 15 students. Permission of instructor M. C. Garcia. For description, see Latin American History.
HIST 271 History of Childhood in the United States (also HD 241 and AM ST 241) (CA) (II) (HA) Spring. 3 credits. Limited to 50 students. J. Brumberg.

An examination of childhood and adolescence in various historical contexts: Puritan New England, slave plantations, evangelical revivals, the Western frontier, Victorian families, reform schools, early high schools and colleges, the sexual revolution of the 1920s, immigrant communities, the Depression and World War II, the 1950s, and more recent social and cultural changes affecting families. Students will evaluate continuities and changes in the lives of American children as well as changing scientific ideas about children. Students have an opportunity to reflect on and write about their own childhood and adolescence. This course is designed to give students a humanities perspective on approaches to childhood.

HIST 272 The Atlantic World from Conquest to Revolution # (III) (HA) Spring. 4 credits. R. Weil and M. B. Norton.

After Europeans first crossed the Atlantic in the late fifteenth century, the ocean became a vast highway linking Spain, France, Britain, and the Netherlands to the Americas and Africa. In this course, we will examine the lives of men and women who inhabited this new world from the time of Columbus to the eighteenth-century revolutions in Haiti and North America. Topics will include the destruction and reconfiguration of indigenous societies; slavery and other forms of servitude; the resistance, rebellion, and accommodation of indigenous groups and slaves; religion; and the construction of gender, race, and ethnicity. Emphasis will be on reading and analyzing primary sources.


HIST 304 American Culture in Historical Perspective, 1880-1980 (also AM ST 304) (III) (CA)

Fall. 4 credits. M. Kammen.

An introduction to the study of modern American culture. Emphasis is on the role of culture in the quest for national identity, the function of cultural myths and myth making, the advent of modernism, relationships between mass culture, popular culture, and high culture; and the question of American exceptionalism (distinctiveness). Special attention is also paid to the situation of subcultures and regions, to the changing role of entertainment in relation to leisure, the media, ethnicity (pluralism), and the decorative and popular arts.

HIST 312 U.S. Foreign Relations, 1750-1912 # (III) (HA) Fall. 4 credits. W. LaFeber.

Examines the development of the U.S. continental and global empires by analyzing policy and policy makers from Benjamin Franklin to Willard Straight. Emphasis is placed on domestic events that shaped foreign policy. In conjunction with HIST 313, a special two hour course. HIST 301 (for discussion and guided research) will be offered.

HIST 313 British-French North America # (III) (HA) Fall. 4 credits. J. Parmenter.

Following explorations in 1513, the sixteenth century, both England and France established permanent colonies in North America during the first decade of the seventeenth century. For the next two-hundred and forty years, each of these European powers 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 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.

HIST 315 Environmental History: The United States and the World (III) (HA) Spring. 4 credits. A. Sachs.

This lecture course serves as an introduction to the historical study of humanity’s interrelationships with the natural world. Environmental history is a relatively new and rapidly evolving field, taking on more importance as the environment itself becomes increasingly important in world affairs. During this semester, we’ll examine the sometimes unexpected ways that “natural” forces have shaped human history (the role of germs, for instance, in the colonization of North America); the ways human beings have shaped the natural world (through agriculture, urbanization, and industrialization, as well as the formation of things like wildlife preserves); and the ways cultural, scientific, political, and philosophical attitudes toward the environment have changed over time. This is designed as an intensely interdisciplinary course: we’ll view history through the lenses of ecology, literature, art, film, law, anthropology, and geography. Our focus will be on the United States, but, just as environmental pollutants cross borders, so too will this class, especially toward the end, when we attempt to put U.S. environmental history into a geopolitical context.

HIST 316 American Political Thought: From Madison to Malcolm X (also AM ST 376 and GOVT 366) # (III) (HA) Fall. 4 credits. Not offered 2004-2005. I. Kramnick.

HIST 318 American Constitutional Development (also AM ST 317) (III) (HA) Spring. 4 credits. Not open to freshmen. R. Polenberg.

Major issues in constitutional history. Topics include the drafting of the Constitution; the Bill of Rights; the Marshall era; the crises caused by slavery and emancipation; the rise of substantive due process; Holmes, Brandeis, and freedom of speech; the Roosevelt "reconstruction"; civil liberties and civil rights in modern America; the right of privacy; the contemporary Supreme Court.


HIST 327 The Old South # (III) (HA) Spring. 4 credits. E. Baptist.

The United States South has fascinated us for years. Americans have often seen it as a pastoral land of moonlight and magnolias, hospitable and premodern, in contrast to the impersonal, modern, capitalist rest of the country. Or, in contrast to the rosy image they have seen it as not the unspoiled part of America, but as the evil, demonic twin of the rest of the U.S.: the land of racism and violence, where slavery, lynching, poverty, and intolerance still hide behind the mask of Southern chivalry. Of course, the actual south is and always has been more complicated than either of these simplistic images. But what is it? What has the South been? What is the role of slavery and racism in Southern— and American—history? And how did the region come to be seen—both by Southerners and others—as so different from the rest of the country?

To answer these questions we will delve into the history of the pre-Civil War South. From the first encounters of the English with Native Americans, to the importation of enslaved Africans, the rise of racial slavery, the American Revolution, the growth of the so-called "Old" South, the development of African-American society and culture, the coming of the Civil War, we will study the ways in which various individuals and groups shaped the society and culture of the region. By the end of the semester, you should come away with a better understanding of how both the realities and the myths of the "Old" South have shaped our past and our present.

HIST 328 American Constitutional History: 1860-1900 (also AM ST 332) (III) (HA) Fall. 4 credits. S. Blumin.

America was born in the country and moved to the city. This course examines the transformation of America from a rural to a rapidly urbanizing society, from the first European settlements to the era of the Civil War. It is also a history of the city itself, as a human community, and as a crucible of cultural contact and change.

HIST 332 The Urbanization of American Society: 1860-2000 (also AM ST 332) (III) (HA) Spring. 4 credits. 332 is not a prerequisite to 333. S. Blumin.

America was born in the country and moved to the city. This course examines the transformation of America from the urbanizing society and culture of the mid-nineteenth century to the thoroughly metropolitan nation of the present (and near future). It is also a history of the city itself, as a human
community, a crucible of cultural contact and change, and a focus of public policy.

[HIST 335 African-American History from Slavery to Freedom # (III)] Fall. 4 credits. Letter only. M. Washington. [Introductory course on African-Americans from 1619 to 1865. Emphasis is on life in bondage, the free black communities, and racism. Other topics include African cultural heritage, the slave trade, religion, the family, and the black freedom struggle.]

[HIST 336 Capitalism and Society in Developing America, 1607–1877 (also AM ST 336) # (III) (HA)] Fall. 4 credits. Not offered 2004–2005. S. Blumin.]


[HIST 340 Recent American History, 1925–1965 (also AM ST 340) (III) Fall. 4 credits. Not open to freshmen. R. Polenberg. 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; and John F. Kennedy and the New Frontier.]


[HIST 345 The Intellectual and Cultural Life of Nineteenth-Century Americans (also AM ST 345 and RELST 345) # (III) Fall. 4 credits. Not offered 2004–2005. R. L. Moore.]

[HIST 346 The Modernization of the American Mind (also AM ST 346) (III) (HA) Spring. 4 credits. R. L. Moore. American thought and culture from 1890 to the present. Emphasizes the intellectual impact of those changes.

[HIST 375 The African-American Worker, 1865–1910: The Rural and Urban Experience (also ILRRCB 385) # (III) Fall. 4 credits. Prerequisite: juniors and seniors, or permission of instructor. Not offered 2004–2005. N. Salvatore.]


[HIST 378 Topics in U.S. Women's History (also AM ST 378 and FGSS 378) (III)] Fall. 4 credits. Preference given to students who have taken HIST/FGSS 273, HIST/FGSS 303, or HIST/FGSS 238. Others: by permission of instructor only. Not offered 2004–2005. M. B. Norton.]


[HIST 414 Motivations of American Foreign Policy (III) (HA) Fall. 4 credits. Prerequisite: permission of instructor. W. LiFeber. Topic for fall 2004: The Roots of U.S. Foreign Policy.]

[HIST 419 Seminar in American Social History (also AM ST 419) (III) (HA) Spring. 4 credits. S. Blumin. Topic for 2005: Race, class, and the American city in the nineteenth and twentieth centuries. Offered in Cornell in Washington program.]

[HIST 420 Asian American Communities (also AM ST 420 and AAS 420) (III) (HA) Fall. 4 credits. Limited to 15 students. Not offered 2004–2005. D. Chang.]

[HIST 421 Undergraduate Seminar in Cultural History (also AM ST 421 and ART H 421) Fall. 4 credits. Limited to 15 students. Permission of instructor required. M. Kammern. Topic for fall 2004: Art controversies in American culture. This seminar will examine art and architecture that have generated major conflicts in U.S. history, mainly during the past century. The primary issues will involve patriotism, religion, race, modernism, feminism, sexuality and obscenity, public art and memorials, "sacred space," and the changing place of museums in American life along with controversial museum exhibitions like Sensations (1999) and motorcycles at the Guggenheim (1998). The role of media, art critics, corporate sponsors, and the general public will be prominent along with art censorship and first-amendment issues.

[HIST 426 The West and Beyond: Frontiers and Borders in American History and Culture (III) (HA) Spring. 4 credits. Limited to 15 students; preference given to junior and senior majors in history and American studies. A. Sachs. “Eastward I go only by force,” said Henry David Thoreau. “That westward I go free.” This seminar explores the many meanings of the West—as a place, as a process, and especially as a borderland—in U.S. history. The Civil War was fought between North and South, but in many ways these two regions were disputing the fate of the West. Indeed, some historians have argued that there is nothing more significant than the idea of the frontier in American history. But did the “westering” movement represent a heroic accomplishment or a tragic act of violent appropriation? What is covered up by the very idea of something called a “West,” with its attendant mythic connotations? We’ll attempt to address these and other questions as we wander along various fault lines in time and space, analyzing American frontiers from the era of the Indian Wars in the Massachusetts Bay Colony to the era of Arnold Schwarzenegger’s governorship.


[HIST 430 America in the Camera's Eye (also AM ST 430.2 and ART H 430) (III or IV) Fall. 4 credits. Limited to 15 students. Permission of instructor required. R. L. Moore. Photographs and films have become archives for historical research. From the era of Matthew Brady’s Civil War images, the United States has been recorded by documentary photographers who have called attention to the country’s progress and its poverty. What can we learn from these images? What is their relation to written texts and to other documents that tell us about the past? How truthful is documentary? Over the course of time, what subjects have been of special interest to photographers? These are some of the questions posed in weekly discussions.

[HIST 432 The City in History: Europe and America # (III) Spring. 4 credits. Prerequisite: permission of instructor. Not offered 2004–2005. S. Blumin.]


[HIST 440 Undergraduate Seminar in Recent American History (also AM ST 440) (III) (HA) Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2004–2005. R. Polenberg.]

[HIST 444 American Men (III) (HA) Fall. 4 credits. Limited to 15 students. E. Baptist. This course will discuss the roles and importance of changing concepts of manhood and masculinity in America. From John Smith and Pocahontas, to George Bush strutting around the deck of a carrier deck, “acting like a man” has been part of achieving and wielding power in American society, politics, and culture. Yet, ideas about manhood—what a man is, who can be one, and what status that gives you—have changed drastically. We will explore the reasons for and consequences of those changes.

[HIST 445 The Rabinov Seminar (also AM ST 430.5 and LSP 430.5) Spring. 4 credits. Permission of instructor required. M. Washington. For description, see AM ST 430.5.]

[HIST 455 The Four Seasons Motif in American Culture (also AM ST 430.2) (III) (CA) Fall. 4 credits. Limited to 15 students. Permission of instructor required. Not offered 2004–2005. M. Kammern.]
HIST 450 Female Adolescence in Historical Perspective (also FGSS 436 and HD 417) (III)
Spring. 4 credits. Limited to juniors and seniors. Limited to 25 students. Prerequisite: permission of instructor. J. Brumberg. For description, see HD 417.

[HIST 466 Iroquois History (also AM ST 468) (III) (HA)]

[HIST 484 Seminar in the History of American Labor: Race, Work, and the City (also ILRCB 304) (III)]
Fall. 4 credits. Open to juniors and seniors only with the permission of the instructor. Not offered 2004–2005. N. Salvatore. For description, see [ILRCB 304].

[HIST 490 New World Encounters, 1500-1800 (also AM ST 490) (III) (HA)]

HIST 497 Jim Crow and Exclusion-Era America (also HIST 697 and AAS 497) (III) (HA)
Spring. 4 credits. Limited to 15 students. D. Chang.

This seminar examines America during the overlapping eras of segregation and immigration exclusion. Beginning with contests over the meaning of freedom during reconstruction and running through the institution of Jim Crow legislation and immigration exclusion, the course ends with an evaluation of mid-twentieth-century immigration exclusion. Beginning with Washington, D.C. An intensive research and writing experience for equality.

Offered in Cornell in Washington Program. Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline's outlook, discourse, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

HIST 500 Undergraduate Research Seminar (also AM ST 500)
Fall and spring. 8 credits each term. S. Jackson. Offered in Cornell in Washington Program. An intensive research and writing experience utilizing the extensive resources of Washington, D.C.

HIST 602 Colloquium in American History
Spring. 4 credits. Required for all first- and second-year graduate students in United States history. M. B. Norton.

This course introduces graduate students to some recent and important scholarship in Early American history. In addition to competing a major research paper based on primary sources, students will be expected to complete all the readings and participate in weekly discussions. Students will also engage questions of pedagogy as they prepare to become teachers of this subject themselves.

HIST 603 Seminar in American Labor History (also ILRCB 783)
Fall. 3 credits. Prerequisites: graduate students only. Not offered 2004–2005. N. Salvatore.

HIST 697 Jim Crow and Exclusion-Era America (also HIST 497)
Spring. 4 credits. D. Chang. For description, see HIST 497.

HIST 710 Colloquium in American History

Asian History

[HIST 190 Introduction to Asian Civilization (also HIST 693) (III)]

[HIST 191 Introduction to Modern Asian History (also ASIAN 191) (III) (HA)]
Fall. 4 credits. J. V. Koschmann and T. Loos.

The history of Asia-Pacific from the nineteenth century to the present, focusing on relations of China, Japan, and Southeast Asia with other and with the West.

[HIST 203 War and Diplomacy in Korea (III) (HA)]

[HIST 207 Sophomore Seminar: The Occidental Tourist: Travel Writing and Orientalism in Southeast Asia (also ASIAN 206 and HIST 507) (III) (HA)]
Spring. 4 credits. Letter grade only. Prefer (but not required) that students have taken HIST 191 or 396. T. Loos.

Travel can change our understanding of ourselves and the world. Throughout the course, we explore the connections between a writer's subjectivity and their experience of the world through their writing. We examine novels, diaries, short essays, and photographic collections by explorers, colonial officials, naturalists, and tourists who travel to and from Southeast Asia. To the extent we can, we also read works about Europe and America written by Southeast Asians. In addition to attending to a writer's subjectivity as it is produced through writing about others, we also consider the historical, political and economic conditions that make travel possible. We will examine how travel writing is inflected with assumptions about the cultural values, race, class, and gender of both travelers and their domestic audience, on the one hand, and the people and places they write about, on the other. We will write about our own travel experiences and photos even as we critique the travel writing genre. The course ends by questioning the role of the internet in the future of tourism and travel in Southeast Asia.

This is a special seminar sponsored by the John S. Knight Institute's Sophomore Seminars Program. Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline’s outlook, discourse, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

HIST 228 Indian Ocean World (also ASIAN 228) (III) (HA)
Fall. 4 credits. Limited to 15 students. E. Tagliacozzo.

This course looks at the many intersecting histories of the Indian Ocean. The Indian Ocean was the first oceanic basin that supported large-scale cross-cultural contact for mankind. These warm tropical waters saw peoples from East Africa, the Middle East, the Indian Subcontinent, and Southeast Asia all meet and mix over many centuries. The course will look at the many intersections of contact, spanning maritime studies, archaeological perspectives, winds and weather patterns (including the vital monsoons), religious migrations (including Buddhism, Christianity, and Islam), and the history of commerce (such as the Spice Trade). We will ask how the Indian Ocean became a cultural crossroads for painting human history over vast, oceanic distances. Open to students interested in world history and its regional variants.

[HIST 230 Seminar in History and Memory: The Asia-Pacific War @ (III) (HA)]
Fall. 4 credits. Seminar designed for undergraduates but open to all students. Limited to 15 students. Not offered 2004–2005. J. V. Koschmann.

HIST 231 Crimes Against Humanity and Their Aftermath: Twentieth-Century East Asia (also ASIAN 238) (III) (HA)
Spring. 4 credits. V. Koschmann and M. Shin.

An investigation of crimes against humanity in twentieth-century East Asia, such as the Chinese Nationalist Party’s suppression of the Taiwan uprising of February 28, 1947, and the South Korean Army’s massacre of civilians at No Gun Ri during the Korean War. The course seeks to enhance critical understanding of “crimes against humanity” as a legal, political, and moral concept, and provide experience in assessing its applicability and implications in specific cases.

[HIST 243 Families in Chinese History in the Nineteenth Century (III)]
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Grade</th>
<th>Term</th>
<th>Instructor</th>
<th>Notes</th>
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<tbody>
<tr>
<td>HIST 293</td>
<td>History of China up to Modern Times (also ASIAN 293) @ (III) (HA)</td>
<td>4</td>
<td></td>
<td>Spring</td>
<td>C. Peterson</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
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<tr>
<td>HIST 320</td>
<td>Japan from War to Prosperity @ (III) (HA)</td>
<td>4</td>
<td></td>
<td>Spring</td>
<td>J. V. Koschmann</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
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<tr>
<td>HIST 395</td>
<td>Premodern Southeast Asia (also ASIAN 397) @ (III) (HA)</td>
<td>4</td>
<td></td>
<td>Fall</td>
<td>E. Tagliacozzo</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
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<td>HIST 396</td>
<td>Southeast Asian History from the Eighteenth Century (also HIST 396 and ASIAN 396/696) @ (III) (HA)</td>
<td>4</td>
<td></td>
<td>Spring</td>
<td>E. Tagliacozzo</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
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<tr>
<td>HIST 410</td>
<td>Archipelago: Worlds of Indonesia (also HIST 417 and ASIAN 409/617) @ (III) (HA)</td>
<td>4</td>
<td></td>
<td>Spring</td>
<td>E. Tagliacozzo</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
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<tr>
<td>HIST 416</td>
<td>Undergraduate Seminar on Gender and Sexuality in Southeast Asia (also HIST 416, ASIAN 416/616 and FGSS 416) @ (III) (CA)</td>
<td>4</td>
<td></td>
<td>Spring</td>
<td>E. Tagliacozzo</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
</tr>
<tr>
<td>HIST 480</td>
<td>Senior Seminar: Gender Adjudicated (also FGSS 480 and ASIAN 482) @ (III) (HA)</td>
<td>4</td>
<td></td>
<td>Fall</td>
<td>T. Loos</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
</tr>
<tr>
<td>HIST 487</td>
<td>Seminar in Thailand (also HIST 687) @ (III) (HA)</td>
<td>4</td>
<td></td>
<td>Fall</td>
<td>K. Taylor</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
</tr>
<tr>
<td>HIST 489</td>
<td>Seminar in Modern Japanese History @ (III)</td>
<td>4</td>
<td></td>
<td>Fall</td>
<td>J. V. Koschmann</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
</tr>
<tr>
<td>HIST 492</td>
<td>Undergraduate Seminar in Medieval Chinese History (also ASIAN 492) @ (III) (HA)</td>
<td>4</td>
<td></td>
<td>Fall</td>
<td>T. Loos</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
</tr>
<tr>
<td>HIST 493</td>
<td>Problems in Modern Chinese History (also ASIAN 493/693 and HIST 693) @ (III) (HA)</td>
<td>4</td>
<td></td>
<td>Fall</td>
<td>S. Cochran</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
</tr>
<tr>
<td>HIST 494</td>
<td>Theories of Civilization (also ASIAN 425) @ (III or IV) (HA)</td>
<td>4</td>
<td></td>
<td>Fall</td>
<td>K. Taylor</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
</tr>
<tr>
<td>HIST 496</td>
<td>Conservation, Politics, and History: Seminar on Comparative Perspectives on Colonialism @ (III) (HA)</td>
<td>4</td>
<td></td>
<td>Spring</td>
<td>M. Rangarajan</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
</tr>
<tr>
<td>HIST 499</td>
<td>Problems in Modern Chinese History (also HIST 694 and ASIAN 499/694) @ (III) (HA)</td>
<td>4</td>
<td></td>
<td>Spring</td>
<td>T. Loos</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
</tr>
<tr>
<td>HIST 507</td>
<td>Graduate Seminar: The Occidental Tourist @ (III) (HA)</td>
<td>4</td>
<td></td>
<td>Fall</td>
<td>T. Loos</td>
<td>For description see HIST 207.</td>
</tr>
<tr>
<td>HIST 598</td>
<td>Colloquium in Modern Japanese History @ (III) (HA)</td>
<td>4</td>
<td></td>
<td>Spring</td>
<td>J. V. Koschmann</td>
<td>Spring 2004–2005. Limited to 15 students.</td>
</tr>
</tbody>
</table>
For description, see American History.

[HIST 274 Foodways: A Social History of Food and Eating # (III) (HA)]

[HIST 275 The Middle Ages: Life and Society in the Western World (also COMP 372) # (III)]
Fall. 4 credits. O. Falk.

[HIST 277 Atlantic World: From Conquest to Revolution (also AM ST 272) # @ (III) (CA)]

[HIST 279 The Crusades @ # (III)]

[HIST 385/685 Vietnamese Histories (also HIST 386) # (III)]

[HIST 417 Comparative Agrarian History (III)]

[HIST 435 Modern Classics in the Historiography of Ancient Greece (also CLASS 435) (III)]
Spring. 4 credits. Prerequisite: an introductory course in ancient Greek history or civilization or permission of the instructor. Not offered 2004–2005. B. Strauss.

[HIST 450 The Peloponnesian War (also HIST 630 and CLASS 450/632) # (III)]
Fall. 4 credits. Prerequisites: HIST 265, CLASS 211 or 217, or permission of instructor. Not offered 2004–2005. B. Strauss.

[HIST 616 Gender and Sexuality in Southeast Asia (also ASIAN 416, ASIAN 616, FGSS 416, and HIST 416)]

[HIST 617 Archipelago: Worlds of Indonesia (also HIST 410 and ASIAN 409/617)]
Spring. 4 credits. Limited to 15 students. E. Tagliacozzo.

For description, see HIST 410.

[HIST 650 Crime and Diaspora in Southeast Asian History, 1750–1950 (ALSO HIST 451)]

[HIST 684 Southeast Asia in the World System: Capitalism and Incorporation, 1500–the Present (also HIST 284)]

[HIST 687 Seminar in Thailand (also HIST 487 and ASIAN 601)]

[HIST 688 Vietnamese Histories (also HIST 388 and ASIAN 385/685)]
Fall. 3 credits. Not offered 2004–2005.

[HIST 693 Problems in Modern Chinese History (also ASIAN 493/693 and HIST 493)]
Fall. 4 credits. Prerequisite: HIST 294 or permission of instructor. S. Cochran.

For description, see HIST 493.

[HIST 694 Problems in Modern Chinese History (also HIST 499 and ASIAN 499/694)]
Spring. 4 credits. Prerequisite: HIST 294 or permission of instructor. S. Cochran.

For description, see HIST 499.

[HIST 696 Modern Southeast Asia: Graduate Prosseminar (also HIST 396 and ASIAN 396/696)]
Spring. 4 credits. T. Loos.

For description, see HIST 396.

[HIST 697 Readings in Modern Japanese Thought]

[HIST 698 Seminar in Japanese Thought]

Comparative History

[HIST 272 The Atlantic World from Conquest to Revolution (also AM ST 272) (III) (HA)]
Spring. 4 credits. R. Weil and M. B. Norton.

For description, see American History.

[HIST 274 Foodways: A Social History of Food and Eating # (III) (HA)]
This course traces the major developments and upheavals in European cultural life from the mid-eighth to the late-nineteenth century, focusing on four broad international movements: the Enlightenment, Romanticism, Realism, and Modernism. In addition to examining developments in art, literature, music, and philosophy, the course considers the changing venues and institutions of culture and with a focus on overarching themes as sociability, public and private space, national identity, gender and sexuality, and subjectivity. Readings include primary texts (including novels, paintings, and operas) as well as contemporary historical and theoretical works.

[HIST 305 Britain, 1660-1815 # (III) (HA)] Fall. 4 credits. Not offered 2004-2005. R. Weil.

[HIST 320 The Viking Age # (III) (HA)] Spring. 4 credits. O. Falk.

This course aims to familiarize students with the history of Scandinavia, ca. 800-1100 AD. Although well known as a dramatic chapter in medieval history, this period remains enigmatic and misunderstood. Our goal will be to set Norse history within its European context, observing similarities with processes elsewhere in the medieval world, the better to perceive what makes the Norse unique. We will examine the social, economic and political activities of the Norsemen in continental Scandinavia, in Western and Eastern Europe, and in the North Atlantic.

[HIST 349 Early Modern England # (III) (HA)] Fall. 4 credits. R. Weil.

This course will explore the crises of political, religious, and epistemological authority that plagued England in the sixteenth and seventeenth centuries. We will examine the political and cultural impact of the Protestant Reformation, the nature of Tudor despotism and Stuart absolutism, the construction of a rhetoric of political dissent around issues of sexuality and corruption, competing understandings of the social order and social control, the development of nation and the invention of liberalism. We will emphasize close reading of contemporary sources, from autobiography and drama to political theory.

[HIST 350 The Italian Renaissance (also ITALL 221) # (III or IV)] Fall. 4 credits. J. Najemy.

An intensive reading seminar offering a close reading of the major works (including Machiavelli, Guicciardini, and Castiglione) of antiquity; vernacular literary currents and their reception; the emergence of the humanist intellectual in politics and society. Emphasis will be placed on select themes of crusading history to the Early Modern period, we will reflect on what is meant by the concept, consider distinctions among forms of violence, and sample a variety of analytical approaches and tools. Graduate students should sign up for HIST 491 Approaches to Medieval Violence (also HIST 692) # (III) (HA) Spring. 4 credits. Limited to 15 students. Permission of instructor required. O. Falk.

[HIST 364 The Culture of the Renaissance II (also COM L 362, ENGL 325, FRLIT 362, RELST 362, MUSIC 390) # (III or IV) (CA)] Fall. 4 credits. Open to freshmen with permission. Not offered 2004-2005. K. P. Long, W. Kennedy.

[HIST 368 Marriage and Sexuality in Medieval Societies: RELST 368, FGSS 368] # (III) (HA) Fall. 4 credits. No formal prerequisite, though some prior knowledge of medieval European history is desirable. P. Hyams. Few topics generally as complex as marriage and sexuality. The course studies Western attempts to deal with the problem of sexuality up to about 1500. The class will first clarify the church's normative rules of law and theology. Armed with this framework we will then turn to more specific topics, including homosexuality and the church's official position, rape, abortion, and sexuality in medieval literature. The goal is to be able to compare the ideal model with the reality, and to this assess the product of the medieval church passed on to Western culture and ourselves. There is no formal prerequisite, but some prior knowledge of medieval European history is desirable.


[HIST 408 Feudalism and Chivalry: Secular Culture in Medieval France, 1000-1300 # (III)] Fall. 4 credits. No prerequisites. HIST 262, 263 or 264 suggested. Not offered 2004-2005. P. Hyams.


[HIST 431 Gender, Power, and Authority in England, 1600-1800 (also FGSS 431) @ (III) (CA)] Spring. 4 credits. Limited to 15 students. Not offered 2004-2005. R. Weil.


[HIST 447 Crusaders and Chroniclers # @ (III)] Fall. 4 credits. Limited to 15 students. P. Hyams.
Modern European History

HIST 723 Sophomore Seminar: Soviet Society and Family Life During WWII: Perceptions (also RUSSL 233 and JWST 233) (III) (CA)

HIST 248 Ghosts and Legacies: The Construction of Public Memory (III) (HA)
Spring. 4 credits. J. Weiss.

HIST 252 Modern Eastern Europe (III) (HA)
Fall. 4 credits. H. Case.

Errata
To correct an error in the print version replace the word Hutus with Tutsis in the description of HIST 218
[HIST 358 Survey of German History, 1890 to the Present (III) (HA)
Fall. 4 credits. Open to freshmen with permission of instructor. Not offered 2004-2005. I. Hull.]

[HIST 362 European Cultural History, 1750-1870 (also COM L 352) # (III or IV) (HA)
Spring. 4 credits. M. Steinberg.
The course will focus on the making of middle-class culture, society, and imagination from the Enlightenment through the French Second Empire. There will be three units with national and thematic foci: Germany in the period of Enlightenment, emancipation, and the burgeoning of national consciousness; questions of law, property, gender, and sexuality in the early nineteenth-century England; modernism and urbanism in Second Empire France. Primary readings (including novels, paintings, and operas) will be considered along with contemporary historical and theoretical readings.

[HIST 363 European Cultural History, 1870-1945 (also COM L 353) (III or IV) (CA)

[HIST 370 History of the Holocaust (also JWST 353) (III) (HA)
Fall. 4 credits. Each student must enroll in a section. Not offered 2004-2005. V. Caron.]

[HIST 371 World War II in Europe (III) (HA)
Summer and fall. 4 credits. Not offered 2004-2005. J. Weiss.]

[HIST 379 The First World War: Causes, Conduct, Consequences (III) (HA)
Spring. 4 credits. Open to freshmen with permission of instructor. P. Holquist and I. Hull.
This course examines the long-term and immediate political, social, and cultural causes of World War I, its catastrophic prosecution, and its repercussions. Recurring themes are: the building of nation-states, the diplomatic and military systems of the nineteenth and twentieth centuries, mass mobilization, the development of mass violence, and the emergence of millenarian visions of the future.

[HIST 383 Europe, 1900-1945 (III) (HA)

[HIST 384 Europe, 1945-1968 (III) (HA)

[HIST 385 Europe in the Twentieth Century: 1968-1990 (III)

[HIST 405 Jewish Culture and Modernity (also S HUM 408, JWST 408, GERST 420)
Fall. 4 credits. Limited to 15 students. Not offered 2004-2005. M. Steinberg.]

[HIST 409 Seminar on Work in Europe and America # (III) (HA)
Fall. 4 credits. Not offered 2004-2005. S. L. Kaplan.]
examines the conflicts and arguments, and the means explored for their apparent resolution. These affected ideas of God and worship, the meanings of gender, conceptions of the natural world and its scientific appropriation, and the legitimacy and proper form of political power. The course will focus on the close study of primary source readings by many of the principal players in all these areas, including Bacon, Hobbes, Locke, and Mary Wollstonecraft.


[HIST 661 Graduate Seminar in Twentieth-Century German History Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2004-2005. I. Hull.


[HIST 673 Seminar in European Intellectual History (also HIST 474) Fall. 4 credits. D. LaCapra. For description, see HIST 474.


History of Science


[HIST 280 The Sciences in the Twentieth Century (also S&T 283) (III) (HA) Fall. 4 credits. Staff. Science emerged as a powerful source of social, economic, and political power during the twentieth century. Through an examination of the development of the sciences—physical and biomedical—during the twentieth century, students learn about the reciprocal relations between science and society. Topics covered may include the rise and development of quantum mechanics; the emergence of Big Science; the history of the sciences in totalitarian nations, especially the former Soviet Union, Nazi Germany, and Communist China; the evolutionary synthesis; the rise and fall of molecular biology; the multiple forms of eugenics; the changing character of the social sciences; the role of new technologies in scientific change, especially computer and communication technologies; the ethics of science as a profession; and the development of science in non-Western cultures.

[HIST 281 Science in Western Civilization (also S&T 281) # (III) (HA) Fall. 4 credits. HIST 281 is not a prerequisite to 282. Staff. 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 science as a cultural phenomenon. Changing perceptions of nature and human knowledge from Greek antiquity to the twentieth 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 nineteenth century after a long period of emergence. 281 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.

[HIST 282 Science in Western Civilization (also S&T 282) # (III) (HA) Fall. 4 credits. HIST 281 is not a prerequisite to 282. 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 science as a cultural phenomenon. Changing perceptions of nature and human knowledge from Greek antiquity to the twentieth 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 nineteenth century after a long period of emergence. This course covers the eighteenth, nineteenth, and early twentieth centuries.

[HIST 287 Evolution (also BIO EE 207, S&T 287) (I or III) (PBS) Fall or summer. 3 credits. A. MacNeill. For description, see BIOEE 207.

[HIST 299 Inventing an Information Society (also ENGRG 298, ECE 298, and S&T 292) (III) (HA) Spring. 3 credits. R. Kline. For description, see ENGRG 298.

[HIST 357 Engineering in American Culture (also ENGRG 357 and S&T 357) Fall. 4 credits. R. Kline. For description, see ENGRG 357.

[HIST 415 Seminar in the History of Biology (also BIO G 467, B&SOC 447, S&T 447) (I or III) (PBS) Summer and fall. Limited to 18 students. Not offered fall 2004. 4 credits. W. Provine. Specific topic changes each year. For description, see BIOEE 467.


[HIST 711 Introduction to Science and Technology Studies (also S&T 711) Fall. 4 credits. M. Lynch and S. Seth. For description, see S&T 711.


Latin American History

[HIST 195 Colonial Latin America # @ (III) (HA) Fall. 4 credits. L. Horowitz. This course examines the "encounter" between Spain and the New World, which began in 1492. Topics include the cultural hybridity that preceded as well as developed from colonialism, the production of ethnicity and race, slavery and economic stratification, intellectual currents and daily life, rebellion and independence.


[HIST 206 Modern Mexico @ (III) Fall. 4 credits. Not offered 2004-2005. R. Kline.

[HIST 216 Gender and Colonization in Latin America @ (III) (HA) Spring. 4 credits. Not offered 2004-2005. R. Krautblatt.

[HIST 224 Art and Politics in Twentieth-Century Latin History @ (III) (HA) Spring. 4 credits. Sophomore Seminar. Limited to 15 students. 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 twentieth century. Topics may include muralism and the Mexican Revolution; working class and indigenous culture in Argentina and the tango; samia social and political protest in Brazil; gender and politics in exile literature; and the appropriation of public spaces as artistic forums and means of communication under authoritarian regimes.


[HIST 240 Seminar: Immigration and Ethnicity in the Twentieth-Century United States (also LSP 241) (III) (HA) Fall. 4 credits. Limited to 15 students. Permission of instructor. M. C. Garcia. This seminar will look at immigration to the United States in the twentieth century, highlighting the experiences of several groups as case studies. We will analyze the "push/pull" factors that compelled people to come to the United States; the nature of cultural and structural assimilation; nativist movements; the evolution of U.S. immigration policy; and the formation of ethnic identity in U.S. society. Attention will be given to current issues such as the impact of global economic restructuring on world labor markets and the role of national policies in shaping immigration patterns.
as immigration reform, bilingual education, and the multiculturalism debate.

[HIST 245] Sophomore Seminar: Drugs: People, Policies, Politics @ (III) (HA)

[HIST 272] Atlantic World: From Conquest to Revolution [also AM ST 272] @ # (III) (HA)
Spring. 4 credits. Intended primarily for sophomore prospective history majors. Open to others by permission of instructor. M. B. Norton, R. Weil.

For description, see American History.

[HIST 301] Perspectives on Latin America [also LASP 301 and SPANL 320]
Spring. 3 credits. M. Roldan.

For description, see LASP 301.

[HIST 306] Modern Mexico: From Independence to the Zapatistas @ (III) (HA)

[HIST 309] History and Geographical Imagination @ (III) (HA)

[HIST 404] Ethnicity, Race, and Indigeneity in Latin America @ (III) (HA)

[HIST 418] Comparative Agrarian History @ (III)

[HIST 423] Chronicles of the Conquest of Latin America @ (III) (HA)

[HIST 424] Art and Politics in Twentieth-Century Latin America @ (III) (CA)

[HIST 431] Farmworkers (also HIST 631, LSP 431, CRP 395.72/679.72, and ILRCS 402)
Spring. 4 credits. M. P. Brady.

For description, see LSP 431.

[HIST 438] History’s Margins: Frontiers and Borders in Comparative Perspective @ # (III) (HA)

[HIST 445] Prostitutes and Patriots: Urban Culture and the Construction of Citizenship in Latin America, 1880-1950 [also HIST 645] @ (III)
Fall. 4 credits. Prerequisites: HIST 295 and/or 296 suggested. Permission of instructor required. Enrollment limited to 15. Not offered 2004–2005. M. Roldan.

[HIST 459] Radicals and Revolutionaries in Modern Latin America [also HIST 659] @ (III) (HA)
Fall. 4 credits. HIST 296, or permission. Limited to 15 students. Not offered 2004–2005. R. Craib.

[HIST 631] Farmworkers (also HIST 431, LSP 431, CRP 395.72/679.72, and ILRCS 402)
Spring. 4 credits. M. P. Brady.

For description, see LSP 431.

[HIST 649] Seminar in Latin American History

[HIST 659] Radicals and Revolutionaries in Modern Latin America [also HIST 459]
Fall. 4 credits. HIST 296, or permission. Limited to 15 students. Not offered 2004–2005. R. Craib.

Near Eastern History

[HIST 253] Introduction to Islamic Civilization I [also NES 255, RELST 255] @ # (III or IV) (HA)

For description, see NES 255.

[HIST 296] Jesus in History, Tradition and Cultural Imagination [also NES 296, RELST 296] @ # (III or IV) (CA)

For description, see NES 296.

[HIST 299] Introduction to Christian History [also NES 295, JWST 295, RELST 295] @ # (III or IV) (HA)

[HIST 372] Law, Society, and Culture in the Middle East, 1200–1500 [also HIST 652, NES 351/651, RELST 350] @ # (III) (HA)

[HIST 461] Seminar in Islamic History 600-750 [also HIST 671, NES 451 and 650, and RELST 451] @ # (III)

[HIST 652] Introduction to Islamic Law [also HIST 372, NES 351/651, RELST 350]

For description, see NES 351/651.

[HIST 671] Seminar in Islamic History [also HIST 461, NES 451, and 650, and RELST 451]

Honors and Research Courses

Note: HIST 201–302 are not regular courses for which students may sign up at will. They are personal arrangements between an instructor and a particular student. Students must first gain the consent of a particular instructor to work with them.

[HIST 201] Supervised Reading
Fall or spring. 2 credits. Open only to juniors and seniors. Prerequisite: permission of instructor. Staff.

[HIST 302] Supervised Research
Fall or spring. 3 or 4 credits. Open only to upperclass students. Prerequisite: permission of instructor. Staff.

[HIST 400] Honors Proseminar
Fall and spring. 4 credits. Limited to 15 students. For prospective honors candidates in history. Prerequisite: permission of a member of the Honors Committee is required to register. R. Weil (fall) and E. Tagliacozzo (spring).

An exploration of major approaches to historical inquiry, analysis, and presentation. Ways of thinking about history along with research methods and organization of the results are considered by reading and discussing a variety of historical works. Substantive readings are drawn from several time periods and diverse geographical areas. There is one short paper during the semester and a longer final paper that explores the work of a major historian or school of historical writing. Students interested in HIST 400 should consult the DUS/head of honors program.

[HIST 401] Honors Guidance
Fall. 4 credits. Prerequisites: HIST 400 and permission of instructor. S. Greene.

[HIST 402] Honors Research
Spring. 4 credits. Prerequisites: HIST 400 and permission of instructor. S. Greene.

[HIST 709] Introduction to the Graduate Study of History
Fall. 4 credits. Required of all first-year graduate students. J. V. Koschmann and M. Roldan.

The course is designed to introduce entering graduate students to crucial issues and problems in historical methodology that cut across various areas of specialization.

[HIST 804–807] Supervised Reading
4 credits each term. Limited to graduate students. Prerequisite: permission of instructor. Staff.

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, feminism, 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 100-level at 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 300 level or above. The core requirements are: pre-seminar; another seminar at the 400 level or above; two courses on art from the following time periods: Ancient Egypt, Medieval Islam, 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 advisers, 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 term of the junior year. Students are advised to enroll in Honors Research (ART H 497) 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 ART H 498 and 499 in his/her course load. These courses address the research and writing of the senior thesis under the direction of the student’s project adviser.

Course Numbering System

100-level courses are freshman writing seminars.

200-level courses are introductions to the major subdivisions of Western art and art outside the West.

300-level courses are intermediary courses addressing more specialized topics or epochs.

400-level courses are seminars primarily for advanced undergraduates and graduate students.

500-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 be used as freshman electives but not to satisfy the distribution requirement or the major.

Courses

ART H 202 Survey of European Art: Renaissance to Modern # (IV) (CA)

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 days of classroom lectures.

ART H 219 Thinking Surrealisms (also COM L 220)

Fall. 4 credits. B. Maxwell. Borrowing its title from a formulation of the Marxist philosopher Ernst Bloch, and beginning from the "forays of demoralization" instigated by the Dadas, who bequeathed to surrealism the precious gift of unreconciliation to the given, this course ranges over the protean expressiveness of several surrealist movements of the last century. The inception of surrealism, the course will practice in Paris in the mid-1920s will be a consideration, perhaps only slightly more central to the course than the explicitly antifascist political phase of the 1950s and 40s, the supplementation of Parisian surrealism by Caribbean, Mexican, African American, Quebecois, and Mauritian writers and artists; the renegade practice of Hans Bellmer and the unshooled surreality of Eugene Atget; the reflections of and on surrealism by Walter Benjamin, Ernst Bloch, and Theodor W. Adorno; the relations of surrealism to the Situationist International; and the recent critiques of surrealism in fiction (Milan Kundera) and scholarship (Hal Foster). Throughout, the course will ask what the proliferation of "thinking surrealisms" meant to twentieth-century culture and politics. All readings are in English.

ART H 220 Introduction to Art History: The Classical World (also CLASS 220) # (IV) (HA)

Fall. 4 credits. Each student must enroll in a section. A. Ramage. This 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.

ART H 221 Minoan-Mycenaean Art and Archaeology (also CLASS 221 and ARKEO 221) # (IV) (CA)

Spring. 3 credits. J. Coleman. For description, see CLASS 221.

ART H 222 Greek Art and Archaeology # (IV) (CA)


ART H 223 Introduction to Art History: Monuments of Medieval Art (also RELST 230) # (IV) (LA)


ART H 245 Introduction to Art History: Renaissance and Baroque Art (also VISST 245) # (IV) (HA)

Fall. 4 credits. Each student must enroll in a section. C. Lazzaro. This course is a survey of major works of European painting, sculpture, prints, and architecture from 1400 to 1750. The course emphasizes the social, religious, and political contexts in which the works were produced and the role of patrons in the creative process. It also introduces the art historical approaches through which we interpret these works. Weekly section meetings are required.

ART H 260 Introduction to Art History: The Modern Era (IV) (CA)

Spring. 4 credits. Not open to students who have taken ART H 261. Each student must enroll in a section. Faculty. This course 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), Pauvism (Matisses), Surrealism (Miro), Abstract Expressionism (Pollock), and Pop Art (Warhol). Different critical approaches are examined.

ART H 261 Introduction to Art History: Modern Art (IV) (CA)

Summer. 3 credits. D. Royce-Roll. This course is an introduction to early modern art as it developed between the French Revolution and the post-World War II era. Both European and American movements are examined, particularly as represented in the Herbert F. Johnson Museum of Art collection where some classes are held. The course combines a chronological survey with a brief examination of topics concerning the social condition, the artist’s vision, and cultural iconology.

ART H 270 Mapping America (also AM ST 270) # (IV) (CA)


ART H 280 Introduction to Art History: Approaches to Asian Art @ # (IV) (CA)


ART H 309 Dendrochronology of the Aegean (also CLASS 309 and ARKEO 309) # (IV) (CA)

Fall and spring. 4 credits. Prerequisite: permission of instructor. Limited to 10 students. P. J. Kuniholm.

Participation in a research project of dating modern and ancient tree-ring samples from the Aegean and Mediterranean. Supervised reading and laboratory work. A possibility exists for summer fieldwork in the Aegean.

ART H 321 Mycenaean and Homer (also CLASS 321 and ARKEO 321) # (IV) (HA)


ART H 325 Greek Vase Painting (also CLASS 325) # (IV) (LA)

Spring. 4 credits. A. Ramage. A stylistic and iconographical approach to an art in which the Greeks excelled. The course is arranged chronologically from the early (eleventh century B.C.), anonymous beginnings to the "personal" hands of identifiable masters of the fifth and fourth centuries B.C. Styles of cities other than Athens are stressed.

ART H 327 Greek and Roman Coins (also CLASS 327) # (IV) (LA)

ART H 343 Art and Society in Early Renaissance Italy # (IV) (HA)
Spring. 4 credits. C. Lazzaro.
The new styles of Donatello, Masaccio, Brunelleschi, and later Botticelli and Alberti, spread from Florence to the courts of northern Italy. A new urban, educated class, increasingly concerned with material goods, commissioned images celebrating individuals, family, and the rituals of birth, marriage, and death, as well as contemporary devotional practices.

[ART H 344 Leonardo, Michelangelo, and Raphael # (IV) (HA)

ART H 345 Rome, Florence, and Venice in the Sixteenth Century # (IV) (HA)

ART H 349 Artistic Identity through Time: From Anonymous to Magnanimous (IV) (HA)
Fall. 4 credits. P. Morin. This course surveys the variety of roles artists have had: haunchers, contrivers, or negotiators over time. The social economic status of the artist has ranged from priestly demigod to slave, manual laborer to intellectual, bohemian to member of the bourgeoisie, visionary, activist to actor, spectator to hero. Constructions of genius and personal negotiation of identity are explored through a variety of sources, including philosophical texts, biography, treatises, and films. We consider artistic identity through gender, ethnicity, nationality, and social economic status. Artistic productions including architecture, painting, sculpture, illustration, and performance are examined from the time of the Pharaohs to the present day, from Imhotep to Warhol.

ART H 350 History of Photography (IV) (LA)
Spring. 4 credits. I. Dadi. This course provides a survey of the history of photography over a course of two centuries. Starting with its invention in the 1830s, we cover the subject both topically and chronologically. During the nineteenth century, we focus on its technical development and on the complex relations that situate photography in relation to painting, portraiture, urban life, war, anthropology, exploration and travel, and science and industry. While these topics continue to be important during the twentieth century, photography has been enriched by new developments that include its use as a modernist and experimental art form, in social documentary and photojournalism, in propaganda, in advertising and fashion, and in its centrality in the practice of conceptual art, postmodernism, and in the digital age.

[ART H 355 Romanesque and Early Gothic Art and Architecture: Europe and the Mediterranean, 900-1150 A.D. (also NES 359) # (IV) (LA)
4 credits. Prerequisite: freshmen enrollment with permission of instructor only. Not offered 2004-2005. C. Robinson.]

ART H 356 Gothic and the Medieval World # (IV) (LA)
Spring. 4 credits. C. Robinson. This course is a survey of the visual culture(s) of the Medieval Mediterranean world from 1140 to 1250 A.D. Through our point of departure is the "Gothic" style in the Ile de France, we also examine the cultures with which "Gothic" France interacted: al-Audalus, Egypt, Turkey, the Crusader Kingdoms, Persia, and North Africa as well as (Christian) Spain, England, and Italy.

ART H 360 Painting Nineteenth-Century America (also AM ST 360) # (IV) (CA)
Spring. 4 credits. L. L. Meixner. This course is an interdisciplinary view of art and life in nineteenth-century America from the colonial era through the Gilded Age. We consider definitions of democratic culture through topical units, including New England portraiture and commodity culture; the art museum in the new republic; genre painting in the Jacksonian era; Hudson River landscape and railroad expansion; photography and the rising middle class; images of African Americans and Reconstruction; images of Native Americans, Manifest Destiny, and the frontier myth; cosmopolitan taste and robber barons in the Gilded Age. Alongside key paintings, we look at print culture including daguerreotypes, postcards, political prints, photographs, and advertisements.

ART H 362 Impressionism in Society (also VISST 362, FGSS 361) # (IV) (CA)
Fall. 4 credits. L. L. Meixner. This course discusses French Impressionist art as products of nineteenth-century public life. By relating Impressionism to state culture, including Universal Expositions, we trace subversive themes such as criminality, café and brothel societies, clandestine prostitution, and class-regulated leisure. We consider images of Parisian spectacle and commodity culture (Manet, Cassatt, Degas, Toulouse-Lautrec) as well as French landscapes (Monet, Van Gogh, Pissarro). Special topics include artists' relationships to novelists (Zola), poets, and the avant-garde theater as well as the construction of the artist and courtesan in Puccini's La Bohème and Berlioz's La Traviata. Images include postcards, playbills, medical photographs, and posters. Organizing our historical units is the theme of power and vision with attention to the female gaze, voyeurism, paranoia, and scopophilia.

[ART H 365 U.S. Art from FDR to Reagan (also AM ST 365) # (IV) (LA)
4 credits. Prerequisite: each student must enroll in a section. Not offered 2004-2005. J. E. Bernstock.]

ART H 366 Contemporary Art and Technology (IV) (CA)
Fall. 4 credits. M. Fernandez. In this course students 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. Beginning with kinetic art and the cybernetically inspired work of the late sixties, we explore early uses of computer technology, including early work in synthetic video in the 1970s. An overview of pre-Internet telematic experiments leads to an investigation of the development of behavioral art forms in an interactive art and interactive installation is a central theme. Critical evaluation of various attitudes concerning technology is encouraged.

[ART H 367 Conceptual Art (IV) (CA)

ART H 368 Modern and Contemporary Latin American Art (also LSP 368) # (IV) (HA)
Spring. 4 credits. M. Fernandez. This course is designed as a thematic survey of Latin American art from the early twentieth 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 prints 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 America artists' exploration of electronic technologies.

ART H 370 Visual Culture and Social Theory (also VISST 307, GOVT 375 and COM L 398) (III or IV) (CA)
Fall. 4 credits. S. Buck-Mors. This course is an introduction to critical concepts for the analysis of visual culture in specific socio-historical contexts.

ART H 371 Architectural History of Washington, D.C # (IV) (HA)
Fall or spring. 4 credits. Only for students in the Cornell in Washington program. Only for non-architects. P. Scott. This course is an historical and critical survey of the architecture of Washington. Attention is given to the styles, architects, and clients—public and private—of the notable buildings and to the urban space of the nation's capital. The vocabulary of architectural analysis and criticism is taught. Field trips required.

ART H 377 African American Art (also AS&R 304) (IV) (LA)
Spring. 3 credits. S. Hassan. This course investigates the different forms of African-American visual artistic traditions in relation to their historical origins and sociocultural context from the early days of slavery to the present day. The course starts with an overview of African art and the experiences of the Middle Passage and slavery in relation to African-American traditions in the decorative arts including pottery, architecture, interior design, quilting, and hanketry. This is followed by a fine-art survey starting with the eighteenth and nineteenth centuries and continuing through the early twentieth-century Harlem Renaissance up to the present. Certain issues related to African-American arts and creativity such as "improvisation," "Black Aesthetic," and "Pan Africanism" also are explored. Slides, films, and filmstrips are used extensively to illustrate topics discussed. Visits to museums and relevant current exhibitions may be arranged.

ART H 378 Art in African Culture and Society (also AS&R 310) (IV) (LA)
Fall. 3 credits. S. Hassan. This course is a 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 complexity 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,
color, form, and sociopolitical order. New and contemporary art forms associated with major socioeconomic changes and processes of assimilation and acculturation also are explored. These include tourist art, popular art, and elite art.

ART H 380 Introduction to the Arts of China (also ARKEO 380 and ASIAN 383) @ # (IV) (LA)
Fall. 4 credits. A. Pan.
This course offers a survey of the art and culture of China from the Neolithic period to the twentieth century. We begin with an inquiry into the meaning of national boundaries and the controversy of the Han Chinese people, which helps us identify the scope of Chinese culture. Pre-dynastic (or prehistoric) Chinese culture is presented through both legends about the origins of the Chinese and through scientifically excavated artifacts. Art of the dynastic and modern periods is presented in light of contemporary social, political, geographical, philosophical and religious contexts. Students work directly with objects in the Herbert F. Johnson Museum of Art.

ART H 384 Introduction to the Arts of Japan (also ASIAN 381 and VISST 200) @ # (IV) (LA)

[ART H 385 Representation and Meaning in Chinese Painting (also ASIAN 386) @ # (IV) (CA)

ART H 390 African American Cinema (also AS&RC 390 and AM ST 386)
Fall. 4 credits. Faculty.
This seminar looks at the history of African American filmmaking from the perspective of directors, actors, studios, and audiences. We study the works of pioneering Black filmmakers from Oscar Micheaux to Julie Dash. Other topics include Race Cinema, Blaxploitation films, the New Black Cinema, Black women's filmmaking, and documentary. Readings in film studies and critical race theory direct our analyses of the films. There are weekly screenings in addition to regular seminar meetings.

ART H 395 The House and the World: Architecture of Asia (also ASIAN 394) @ # (IV) (HA)
Spring. 4 credits. K. McGowan.
In many Asian societies, houses are regarded as having a life force or a vitality of their own. This course examines the role of the house as a living organism in Asia, a symbol of the cosmos encapsulated. Houses also function in many societies 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 serve to blend with the vitality of the house. The indigenous architectural traditions of India, Vietnam, Thailand, Indonesia, and the Philippines are examined.

ART H 396 The Arts of Southeast Asia @ # (IV) (CA)
Fall. 4 credits. K. McGowan.
The arts of Southeast Asia are studied in their social context, because art plays a role in most of the salient issues in life in traditional societies. Special emphasis is devoted to developments in Indonesia, Thailand, and Cambodia. Among topics covered are the shadow puppet theater of Java, textiles, architecture, sculpture, and Bali's performance tradition.

ART H 400 Proseminar (also VISST 400) @ # (IV) (CA)
Fall. 4 credits. Prerequisite: History of Art majors only. Enrollment is limited. 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 theories 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 5:00–6:30 P.M.

ART H 401 Independent Study
Fall or spring. 2–4 credits. May be repeated for credit. Prerequisite: permission of a 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.

ART H 402 Independent Study
Fall or spring. 2–4 credits. May be repeated for credit. Prerequisite: permission of a 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.

ART H 407 The Museum and the Object (also VISST 407) @ (IV) (CA)

ART H 411 The Multicultural Alhambra (also S HUM 411, NES 451, and SPAN 411)
Fall. 4 credits. C. Robinson.
An interdisciplinary seminar structured around the mythic (and, as presented by most extant scholarship, quintessentially "Islamic") palace built by the Nasrid dynasty in Granada, Spain, and its function as both subject and object in a myriad of cultural translations (textual, visual, ideological, religious). We use primary sources in various genres, critical writings in the field of postcolonial 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), to approach this “enigmatic” structure and place it in a variety of contexts. We 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 to deconstruct the mythology of its uniqueness and view it as a monument supremely representative of the continuous performance of cultural politics offered by late medieval Iberia. The seminar is taught in conjunction with Interrogating Iberian Frontiers: A Cross-Disciplinary Research Symposium on Mujedería history, Religion, Art, and Literature, to be held at Cornell during the fall of 2004. Students will attend the symposium and participate in discussions, both organized and informal, with the speakers, including Dr. Díez-Jorge.

ART H 412 The Late Medieval Art of Devotion (IV) (HA)
Spring. 4 credits. C. Robinson.
This seminar explores the changing relationship of art and “European” viewer during the late medieval period (1250–1450), with particular focus on what has come to be known as the “devotional image,” i.e., small works of art produced for use in private devotions by individuals or small groups of viewers. We read a wide-ranging selection of both primary and secondary sources, the latter including Hans Belting, Jeffrey Hamburger, Caroline Bynum, and Erwin Panofsky. We also examine a little-studied category of images, the late-medieval Spanish retablo, or altarpiece, in an effort to determine where these objects fit (or don’t) within the late medieval climate of affective piety.

ART H 413 Race, Technology and Visuality (also AAS 413) @ (IV) (CA)
Fall. 4 credits. T. Tu.
This course examines how new information and communication technologies have altered the ways we visualize and perform racial identities. In this course we question the popular assumption that the "information revolution" has made it possible and even desirable to transcend racial differences by exploiting: 1) How racial hierarchies have informed debates around technoliteracy, creativity, ownership, and agency. 2) How race is embodied (through visual and linguistic cues) in the ostensibly disembodied domains of virtual media. 3) How the emergence of interactive, online, electronic entertainment, and mobile technologies has allowed artists to generate new images of and ideas about racial and ethnic identities.

ART H 414 Popular Culture and Visual Practice in Asian America (also AAS 414) @ (IV) (CA)
Spring. 4 credits. T. Tu.
Through a variety case studies, this course examines the forms and practices of Asian American popular culture (including music, film, video, print and visual, decorative, and performance arts) within local, social, and economic contexts that have shaped their production. In this course, we ask: What is the relationship of these popular forms to the histories of Asian American community arts? How have Asian Americans' engagements with "the popular" altered "traditional" modes
of visual representation, artistic production, and cultural exchange? In this course we also consider how the circulation of Asian popular culture in the United States (from anime to Bollywood and beyond) has informed the styles, fashions, and visual vocabularies of contemporary Asian American culture.

ART H 421 Undergrad Seminar in Cultural History (also HIST 421 and AM ST 421)
Fall. 4 credits. M. Kammen.
This seminar examines art and architecture that have generated major conflicts in U.S. history, mainly during the past century. The primary issues involve patriotism, religion, race, modernism, feminism, sexuality and obscenity, materialism, and "sacred space," and the changing place of museums in American life along with controversial museum exhibitions like Sensation (1999) and motorcycles at the Guggenheim (1998). The role of media, art critics, corporate sponsors, and the general public is prominent along with art censorship and First Amendment issues.

[ART H 422 Ceramics (also CLASS 423 and ARKEO 432) # (IV) (CA)]

ART H 427 Seminar on Roman Art and Archaeology (also CLASS 435 and ARKEO 435) # (IV) (CA)
Spring. 4 credits. Not open to freshmen or sophomores without permission of instructor. A. Ramage.
Topic for spring 2005 to be announced.

ART H 430 America in the Camera's Eye (also HIST 430, RELST 430, and AM ST 430.2) (III or IV)
Fall. 4 credits. R. L. Moore.
Photographs and films have become archives for historical research. From the era of Matthew Brady's Civil War images, the United States has become a subject that landscape photographers have called attention to the country's progress and its poverty. Hollywood filmmakers have also recorded endless images of the American landscape and placed in the service of commercial narrative accounts of the country's history and its social problems. What can we learn from these images? What is their relation to written texts and to other documents that tell us about the past? How truthful is documentary? How misleading is Hollywood? One key text is James Agee's and Walker Evans's Let Us Now Praise Famous Men. The seminar meets once each week for discussion and periodically during the semester to view films.

[ART H 434 The Rise of Classical Greece (also ARKEO 434 and CLASS 434) # (IV) (HA)]
Spring. 4 credits. Recommended: CLASS 220 or ART H 220, CLASS 221 or ART H 221, or permission of instructor. Not offered 2004-2005. F. L. Kuniholm.

ART H 447 Aesthetic Theory: End of Art (also GERST 566 and COM L 566) # (IV)
Fall. 4 credits. Permission of instructor. P. Gilgen.
This course investigates the emergence of aesthetics as an autonomous discipline at the end of the eighteenth century. In a first phase, we examine the rationalist articulation of aesthetics in Baumgarten's work and Burke's Enquiry. Drawing on the findings of these two traditions, Kant's Critique of Judgment (1790) inaugurated a preoccupation in German aesthetics around 1800 with the philosophical status of the beautiful and of art. Especially in Romantic theory and practice, art was meant to provide a solution to the philosophical dilemmas in the wake of Kant's critical philosophy. But already in Hegel's Phenomenology, and more explicitly in the Encyclopaedia and the Lectures on Aesthetics, art lost this elevated position vis-à-vis philosophy. Taking this observation as a guiding thread, the main part of the course is structured around in-depth readings that may include Kant, Schiller, Schelling, Schlegel, Novalis, Holderlin, and Hegel. Further readings may include writings by contemporary philosophers and theoreticians—such as Derrida, Lyotard, de Man, Adorno, and Danto—whose work on aesthetics takes its starting point from the philosophical issues surrounding the emergence of aesthetic theory only to transcend these historical confines and formulate contemporary positions on the status of the aesthetic. The following questions are addressed: What are the conditions for the move from the subjective judgment of taste (Kant) to objective beauty (Romantics, Hegel)? How is the relation of art and nature reconceived by the Romantics? What is the relation between aesthetic theory and the history of art? Is philosophy the end of art?

[ART H 448 Constructing the Self in the Seventeenth Century # (IV) (HA)]

ART H 450 Women in Italian Renaissance Art (also FGSS 451) # (IV) (HA)

ART H 451 Prints of the Fifteenth through the Seventeenth Century # (IV) (HA)
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2004-2005; next offered fall 2005. C. Lazzaro.

ART H 452 Topics in Early Modernism (also VISST 462) (IV)
4 credits. Prerequisite: permission of instructor. Auditing is not permitted. Not open to freshmen or sophomores. Not offered 2004-2005. L. L. Meixner.

ART H 463 Studies in Modern Art (IV) (LA)

ART H 464 Studies in Modern Art (IV) (LA)

ART H 466 Women Artists (also FGSS 404) (IV) (LA)

ART H 476 Seminar in American Art (IV) (CA)

ART H 478 African Cinema (also AS&RC 435) @ (IV) (LA)

ART H 481 Art of the Tang Dynasty (618-907) (also ASIAN 479) @ # (IV)
4 credits. Prerequisite: ART H 483 or a course in Chinese history or Chinese literature and permission of instructor required. Not offered 2004-2005. A. Pan.

ART H 482 The Era of Contention: Contemporary Taiwanese Art Since 1987 (also ASIAN 482 and VISST 482) @ (IV) (HA)

ART H 483 Arts of the Song Dynasty, with Focus on Tea Cultures in East Asia # @ (IV)
Fall. 4 credits. Prerequisite: permission of instructor. A. Pan.

ART H 490 Art and Collecting: East and West (also ASIAN 491) @ # (IV) (CA)
Fall. 4 credits. K. McGowan.
This course examines the social life of things, focusing in particular on the collection as an organizing metaphor for cross-cultural exploration. By examining biographies of objects, and the extent of their influence, it is possible to observe the transformation of gifts or heirlooms into commodities and vice versa as constellations of cultures appropriate objects and ideas across vast distances, East and West. India, Europe, China, America, Japan, and Mainland and Island Southeast Asia are examined at different points historically where dynamic convergences occur in the traffic of culture.

ART H 491 Comparative Modernities @ (IV) (CA)
Spring. 4 credits. I. Dadi.
Since the late nineteenth century, the effects of capitalism across the globe have been profoundly transformative and have continued to intensify with the demise
of the older colonial empires, the rise of national independent states, and the onset of neoliberal globalization. This transformation is manifested in the constitution of the visible neoliberal globalization. This transformation of immigrant and diaspora artists working both in the West and the non-West, and upon contemporary artists working today within the West itself, has resulted in a near exclusive attention to Euro-American modernism and art history and the visibility of immigrant cultural studies, and the focusing of a near exclusive attention in art historical studies of earlier decades in cases of artistic and theoretical practices in the East and the West contribute to a reformulation of the specificity of national and/or Western paradigms of the body? The seminar provides a brief introduction to the cultural significance of plants, animals, and collections of natural objects, Italian gardens of the sixteenth and seventeenth centuries, and the Vernaculars of King Louis.

ART H 497 Honors Research
Fall or spring. 2 credits. Staff.
This course, the prospective honors student does rigorous independent readings supervised by a selected thesis advisor. By the end of the semester and annotated bibliography and detailed outline of the thesis should be completed.

ART H 498 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 the selection of an appropriate thesis topic.

ART H 499 Honors Work II
Fall or spring. 4 credits. Prerequisite: ART H 498.
The student under faculty direction prepares a senior thesis.

ART H 506 Contemporary African Diaspora Art (also AS&RC 506)
Fall. 4 credits. Faculty.
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 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 focus on artists working after 1900 but also study the roots of the 20th century and in earlier periods.

ART H 520 Seminar in Classical Archaeology (also CLASS 630 and ARKEO 520)
Fall. 4 credits. Prerequisite: permission of instructor. A. Ramage.

ART H 531 Leon Battista Alberti: 1404–1472
4 credits. Prerequisite: not open to freshmen or sophomores without permission of instructor. Not offered 2004–2005. P. Morin.

ART H 540 Seminar in Renaissance Art
Fall. 4 credits. Prerequisite: permission of instructor. C. Lazzaro.
Topic: Nature, Cultural Landscape, and Gardens in Early Modern Europe. This seminar examines cultural understandings of nature in early modern Europe, especially Italy. It considers concepts such as "second nature," "cultural landscape," and "pastoral," the cultural significance of plants, animals, and collections of natural objects, Italian gardens of the sixteenth and seventeenth centuries, and the Vernaculars of King Louis.

ART H 549 Problems in Interpretation in Italian Renaissance Art

ART H 570 Introduction to Critical Theory
Fall. 4 credits. Prerequisite: graduate students only. M. Fernandez.
This seminar will introduce students in art, art history, and architecture to diverse theoretical texts of relevance to the three fields. Readings will include classic texts in poststructural theory and more recent writings in new areas of theory and art practice including: digital art, cyberfeminism, 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, the seminar will focus on a single topic of convergence for these diverse areas.

ART H 571 African Aesthetics (also AS&RC 503)

ART H 572 Theory Seminar II: Mimesis

ART H 574 Cyberfeminism
Spring. 4 credits. Limited to 15 students. M. Fernandez.
In this seminar students will investigate the emergence of cyberfeminism in art and theory in the context of feminism, post-feminism and the accelerated technological developments of the last thirty years of the twentieth century. The course will focus on texts by Donna Haraway, Luce Irigaray, Sadie Plant, Allucquere Rosanne Stone, Elizabeth Grosz, and Rosie Braidotti as well as on the work of relevant women artists.

ART H 575 Digital Bodies, Virtual Identities (also ENGL 696 and COM L 692)
Fall. 4 credits. T. Murray.
This seminar will read theory, contemporary art, and video to question the status of "the body" as it is scanned, mapped, pixelized, pinged, and otherwise encoded in the digital sphere. Do recent procedures of digitized virtualization of the body contribute to or alter notions of identity developed in philosophy, psychoanalysis, and identity politics? How does the cross-globalization of the tracked and unique body contribute to our understanding of corporeal specificity and ethnic, national, or economic particularity? Do feminist and queer appropriations of new technology alter assumptions about sexuality and gender in the digital age? And do increasingly interactive artistic and theoretical practices in the East and the West contribute to a reformulation of the specificity of national and/or Western paradigms of the body? The seminar provides a brief introduction to the cultural significance of plants, animals, and collections of natural objects, Italian gardens of the sixteenth and seventeenth centuries, and the Vernaculars of King Louis.

ART H 580 Dancing the Stone: Body, Memory, and Architecture (also VISSTS 580, ASIAN 580 and THETR 580)
Spring. 4 credits. Prerequisite: permission of Instructor. K. McGowan.
This course examines the role of temples and their sculptures in South and Southeast Asia as 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 imply the 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. Bringing back the haptic sense (i.e., of feeling and doing at the same time) 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.

ART H 591–593 Supervised Reading
591–593; fall, spring. 4 credits. May be repeated for credit. Limited to graduate students.

ART H 660 Visual Ideology (also GERST 660)
Fall. 4 credits. G. Waite.
Some of the most powerful analyses of "visual culture" have come from outside or on the peripheries of the primary traditions designed to study it. At the same time, in a climate where focus is on currently more fashionable media, the great contributions to visual analysis made by art historians looking at oil paintings tend to be overlooked. This seminar analyzes the interactions between "traditional" disciplines, such as iconography and connoisseurship, and innovations coming from philosophy, psychoanalysis.
Historiography, sociology, literary theory, feminism, and Marxism. We develop 1) a general theory of "visual ideology," that is, the gender, social, racial, and class determinations on the production, consumption, and appropriation of visual "culture" from the Renaissance and Baroque till now; and 2) specific critical practices that articulate those determinations. Examples are drawn mainly from the history of oil painting, but issues related to architecture, city planning, photography, and cinema also come up. In addition to art historians, authors include Althuser, Benjamin, Copeje, Deleuze, Derrida, Freud, Carlo Ginzburg, Karatani Kojin, Lacan, Lyotard, Jose Antonio Maravall, and Nietzsche.

HUMAN BIOLOGY PROGRAM

J. Haas (nutritional sciences), director, 127 Savage Hall, 255-6001; B. Finlay (psychology), J. Fortune (women's studies), E. Frongillo (nutritional sciences), R. Johnston (psychology), K. A. R. Kennedy (ecology and systematics/anthropology), D. Levitsky (nutritional sciences), D. L. Pelletier (nutritional sciences), W. Provine (ecology and evolutionary biology), R. Savin-Williams (human development), M. Small (anthropology)

Human biology integrates the methods and theories of many disciplines, such as biological anthropology, nutrition, neurobiology, physiology, psychology, demography, ecology, genetics, and paleontology into a comprehensive study of biological diversity in Homo sapiens. A central focus of this interdisciplinary approach to the study of the human organism is an understanding of evolutionary processes that explain our biological variation through space and time. The curriculum of study seeks to educate future biological scientists to address the concerns of a society that is becoming more demanding of the scientific community to place its specialized biological knowledge in a broad context. The human biology curriculum is of particular relevance to undergraduate students in premedical and predentistry programs, biological anthropology, nutrition, human development, ecology and evolutionary biology, psychology, physiology, genetics, and the health-related sciences. It serves to bring together students who have a common interest in humankind as defined from these diverse fields and to provide a forum for student-faculty interaction on various topics relating to human evolution and biological diversity. Human biology is not a major but a curriculum of study that provides majors in various departments with a program for selecting elective courses that deal with the biology of the human species. Students in their junior year may develop a program of study in human biology while majoring in 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 physical 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 (BIO S 101-103 plus 102-104 or 105-106 or BIO S 107-108 offered during the eight-week Cornell Summer Session), one year of general chemistry (CHEM 207-208 or 215-216), one year of college mathematics (MATH 111-112 or 105-106 or 111-105), one course in genetics (BIO S 281 or 282), one course in biochemistry (BIO S 330, 331, 332, or 333 or NS 320). 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 adviser in human biology for help in selecting appropriate courses.

Elective courses should be taken that will 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 histological 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 adviser 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 advisers in his or her department who is listed as faculty in human biology to be their principal adviser, or he or she may have an adviser in the department of the major and seek the advice of a human biology faculty adviser in matters pertaining to satisfaction of the requirements. In certain cases a faculty adviser may represent both the major and the curriculum of study in human biology.

Courses

Human Anatomy and Physiology

BIOAP 214 Biological Basis of Sex Differences (also B&SOC 214 and FGSS 214)
Spring. 3 credits.

BIOAP 311 Introductory Animal Physiology, Lectures
Fall. 3 credits.

BIOAP 319 Animal Physiology Experimentation
Fall. 4 credits.

BIOAP 458 Mammalian Physiology
Spring. 3 credits.

BIOBM 434 Applications of Molecular Biology to Medicine, Agriculture, and Industry
Fall. 3 credits.

BIOBM 439 Molecular Basis of Human Disease (also BIOGD 439)
Fall. 3 credits.

BIOEE 274 The Vertebrates: Structure, Function, and Evolution
Spring. 4 credits.

BIOEE 474 Forensic Anthropology and Human Biology (also ANTHR 474)
Spring. 5 credits.

BIOM 431 Medical Parasitology (also VETMI 431)
Fall. 2 credits.

NS 115 Nutrition, Health, and Society
Fall. 3 credits.

NS 222 Maternal and Child Nutrition
Fall. 3 credits.

NS 262 Nutrients and Cells
Spring. 3 credits.

NS 315 Obesity and the Regulation of Body Weight (also PSYCH 613)
Spring. 3 credits.

NS 331 Physiological and Biochemical Bases of Human Nutrition
Spring. 4 credits.

NS 341 Human Anatomy and Physiology
Spring. 4 credits.

NS 361 Biology of Normal and Abnormal Behavior (also PSYCH 361)
Fall. 3 credits.

NS 421 Nutrition and Exercise
Spring. 3 credits.

NS 431 Mineral Nutrition and Chronic Disease
Fall. 3 credits.

NS 441 Nutrition and Disease
Fall. 4 credits.

NS 475 Mechanisms Underlying Mammalian Developmental Defects (also BIOAP 475)
Spring. 3 credits.

PSYCH 322 Hormones and Behavior (also BIOMN 322)
Fall. 3 or 4 credits.

PSYCH 425 Cognitive Neuroscience
Fall. 4 credits.
PSYCH 460 Human Neuroanatomy (also BIONB 420, sec 02) Spring. 3 or 4 credits.

Human Behavior
ANTHR 390 Primate Behavior and Ecology Spring. 4 credits.

ANTHR 490 Topics in Biological Anthropology Spring. 4 credits.

B&SOC 301 Biology and Society I: The Social Construction of Life (also S&TS 401) Fall. 4 credits.

B&SOC 327 Evolutionary Perspectives on Human Behavior Fall. 3 credits.

B&SOC 392 Drugs and the Brain Spring. 4 credits.

B&SOC 421 Effects of Aging on Sensory and Perceptual Systems (also PSYCH 431 and 631) Fall. 3 or 4 credits.

BIONB 422 Modeling Behavioral Evolution Spring. 4 credits.

BIONB 427 Animal Social Behavior Fall. 4 credits.

BIOL 348 The Healing Forest Spring. 2 credits.

DEA 325 Human Factors: Ergonomics—Anthropometrics Fall. 3 credits.

HD 266 Emotional Functions of the Brain Spring. 3 credits.

HD 344 Infant Behavior and Development Fall. 3 credits.

HD 366 Psychobiology of Temperament and Personality Fall. 3 credits.

NS 245 Social Science Perspectives on Food and Nutrition Fall. 3 credits.

NS 347 Human Growth and Development: Biological and Behavioral Interactions (also HD 347 and B&SOC 347) Spring. 3 credits.

NS 361 Biology of Normal and Abnormal Behavior (also PSYCH 361) Fall. 3 credits.

PAM 380 Human Sexuality Spring. 3 credits.

PSYCH 223 Introduction to Biopsychology Fall. 3 credits.

PSYCH 326 Evolution of Human Behavior Spring. 4 credits.

PSYCH 422 Developmental Biopsychology Fall. 4 credits.

PSYCH 425 Cognitive Neuroscience Fall. 4 credits.

Human Evolution and Ecology
ANTHR 101 Introduction to Anthropology: Biological Perspectives on the Evolution of Humankind Fall. 3 credits.

ANTHR 203 Early People: The Archaeological and Fossil Record (also ARKEO 203) Spring. 3 credits.

ANTHR 375 Evolutionary Theory and Human Behavior (also ANTHR 675) Spring. 4 credits.

ANTHR 390 Primate Behavior and Ecology Spring. 4 credits.

ANTHR 490 Topics in Biological Anthropology Spring. 4 credits.

BIOEE 261 Ecology and the Environment Fall or summer. 4 credits.

BIOEE 275 Human Biology and Evolution (also ANTHR 275 and NS 275) Fall. 3 credits.

BIOEE 278 Evolutionary Biology Fall or spring. 3 or 4 credits.

BIOEE 371 Human Paleontology (also ANTHR 371) Fall. 4 credits.

BIOEE 464 Macroevolution Spring. 4 credits.

BIOEE 469 Food, Agriculture, and Society (also B&SOC 469 and S&T 469) Spring. 3 credits.

BIOEE 673 Human Evolution: Concepts, History, and Theory (also ANTHR 673) Fall. 3 credits.

BIOGD 481 Population Genetics Fall. 4 credits.

BIOGD 482 Human Genetics and Society Fall. 4 credits.

BIOGD 484 Molecular Evolution Spring. 3 credits.

B&SOC 447 Seminar in the History of Biology (also HIST 447, BIO G 447, and S&T 447) Summer. 4 credits.

NS 306 Nutritional Problems of Developing Nations Spring. 3 credits.

NS 450 Public Health Nutrition Spring. 3 credits.

NS 451 Epidemiology and Health of Human Communities Fall. 3 credits.

NS 452 Molecular Epidemiology and Dietary Markers of Chronic Disease Spring. 3 credits.

PAM 303 Ecology and Epidemiology of Health Spring. 3 credits.

PSYCH 326 Evolution of Human Behavior Spring. 4 credits.

D SOC 201 Population Dynamics (also SOC 202) Spring. 3 credits.

VETMI 431 Medical Parasitology (also BIOMI 417) Fall. 2 credits.

VTPMD 664 Introduction to Epidemiology Fall. 3 credits.

HUNGARIAN

See Departments of Linguistics and Russian.

INDEPENDENT MAJOR PROGRAM

S. Friedfield, director, 172 Goldwin Smith Hall, 255–5792.

The Independent Major Program is described in the introductory section of Arts and Sciences.

IM 351 Independent Study
Fall or spring. 1–4 credits. Prerequisite: permission of the program office.

IM 499 Honors Research
Fall or spring. 1–8 credits. a maximum of 8 credits may be earned for honors research. Prerequisite: permission of program director. Each participant must submit a brief proposal approved by the honors committee.

INDONESIAN

See Department of Asian Studies.

INEQUALITY CONCENTRATION

Office: 363 Uris Hall
Web: www.inequality.cornell.edu
Telephone: 254-8674

The study of inequality lies at the heart of current debates about welfare reform, affirmative action, the “glass ceiling,” globalization, and any number of other contemporary policy issues. In recent years, public and scholarly interest in issues of inequality has intensified, not merely because of historic increases in income inequality in the United States and other advanced industrial countries, but also because inequalities of race, ethnicity, and gender are evolving in equally dramatic and complicated ways.

The Inequality Concentration 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 concentration thus allows students to combine these resources into an integrated program of study. The institutional home for the Inequality Concentration is the Center for the Study of Inequality (located at 363 Uris Hall and at www.inequality.cornell.edu).
The Inequality Concentration is appropriate for students interested in government service, policy work, and related jobs in non-governmental organizations (NGOs) as well as students who wish to pursue post-graduate education in such fields as public policy, economics, government, law, history, psychology, sociology, anthropology, literature, and philosophy. In many of these fields, the study of inequality is becoming increasingly central and fundamental, and the Inequality Concentration can therefore provide students with a valuable and unique foundation for further study.

The Inequality Concentration is not a major but rather is an interdisciplinary program that should be completed in conjunction with a major. The concentration is open to students enrolled in any of the seven Cornell undergraduate colleges. If the requirements of the concentration are met, a special notation to this effect will be recorded on the transcript.

Concentration Requirements

The Inequality Concentration exposes students to the breadth of approaches, methods, and topic areas on offer while also allowing them to tailor a program to their particular interests. The requirements are as follows:

A. Overview Course
The required overview course may be selected from any of the eight courses listed below. When possible, the overview course should be completed early in the program, as it serves to define the field and to expose students to areas and topics that might be explored in future course work.

- Income Distribution (ILRLE 441)
- Inequality, Diversity, and Justice (PHIL 193, CRP 293, GOVT 293, and SOC 293)
- Power and Poverty in America (GOVT 310)
- Social Inequality (SOC 208 and D SOC 209)
- Comparative Social Stratification (D SOC 370 and SOC 371)
- Social Inequality: Contemporary Theories, Debates, and Models (SOC 518)
- Introduction to Social Inequality (SOC 108)
- Inequality and Social Science (SOC 221)

B. Controversies About Inequality
(SOC 222, PAM 222, ILRLE 222, PHIL 195, D SOC 222, and GOVT 222)

This seminar (taken for 2-3 credits) introduces students to other concentrators and to faculty at Cornell University carrying out relevant research. Many Controversy courses are exposed to research on inequality under way at Cornell, and they also participate in debates staged between faculty who take opposing positions on pressing inequality relevant issues (e.g., welfare reform, school vouchers, immigration policy, affirmative action). Because it introduces concentrators to potential advisers and lines of study, this course is best taken early in the program.

C. Electives
In addition to the overview course and seminar, students must select four electives from the list of qualified courses. This list is available from Liz Heitner (363 Uri Hall) or can viewed on the web site for the Center for the Study of Inequality, see 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).

D. Lectures and Seminars
The Center for the Study of Inequality (CSI) hosts occasional lectures and symposia, and concentrators are expected to attend them when possible. These events will be announced via email and are also listed on the center web site, www.inequality.cornell.edu.

Enrolling in the Concentration

The web site for the Center for the Study of Inequality, www.inequality.cornell.edu, provides current information on the Inequality Concentration (see listing under the heading “Academic Training”). For students considering the Concentration, it may be useful to schedule a meeting with the executive administrator of CSI, Liz Heitner (inequality@cornell.edu). Once a decision is made to enroll, a faculty adviser should be chosen to help design a program of study that combines effectively with the major, that is intellectually coherent, and that serves future career and professional interests well.

Research and Internship Opportunities

The Center for the Study of Inequality serves as a clearinghouse for internship opportunities in the areas of poverty and inequality (see CSI web site under “Finding an Internship”). Additionally, the CSI can assist students who wish to become involved in research by matching them to faculty projects of interest, and by providing small research grants for student-initiated research (see CSI web site under “Student Research Grants”).

Advisers

The Inequality Concentration is governed by a director and executive board. Although all members of the board (including the director) may serve as student advisers, some members are not currently taking on new advisees. The listing of available advisers can be obtained from Liz Heitner at inequality@cornell.edu.

Director: Stephen Morgan, Associate Professor, Sociology

Executive Board: N’Dri Assie-Lumumba. Associate Professor, Dept. of Education and African Studies; Kaushik Basu. C. Marks Professor of International Studies and Professor, Dept. of Economics; David Dunning. Professor, Dept. of Psychology; Gary Fields. Professor, School of Industrial and Labor Relations; Maria Cristina Garcia. Director, Latino Studies Program and Associate Professor, Dept. of History; Davydd Greenwood. Goldwin Smith Professor of Anthropology and Director, Institute for European Studies; Douglas Gurak. Director, Population and Development Program and Professor, Rural Sociology; Michael Jones-Correa. Associate Professor, Dept. of Government; Ravi Kanbur, T. H. Lee Professor of World Affairs, Dept. of Applied Economics and Management; Mary Katzenstein. Professor, Dept. of Government; Richard Miller. Professor, Dept. of Philosophy; Satya Mohanry. Professor, Dept. of English; Elizabeth Peters. Professor and Director, Asia-Pacific Studies, Dept. of Policy Analysis and Management; Jonas Pontusson. Professor, Dept. of Government; Szonja Szelenyi, Associate Professor, Sociology.

Sample Programs

The Inequality Concentration allows students considerable flexibility in devising programs that reflect their interests. As examples of possible programs, we have listed below ten 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 not obviously illustrative and does not cover the entire wide range of interests that may be addressed within the concentration. It is important for students and advisers to work together to formulate an individualized program of study that may draw only partially, if at all, from the programs listed below.

General Track

The objective of the general track is to provide a broad foundation that addresses the many forms of inequality (e.g., class, gender, ethnic) as well as the various approaches and perspectives (e.g., economic, sociological, historical) that have been brought to bear on these forms. The sample schedule outlined below is just one of many possible programs that meets this generalist objective.

I. Overview Course (choose any one)

II. Controversies About Inequality (SOC 222, PAM 222, ECON 222, ILRLE 222, PHIL 195, and GOVT 222)

III. Possible Electives

Economics of Hunger and Malnutrition (ECON 474 and NS 457)
Race, Power, and Privilege in the United States (AS&RC 280)
Gender Inequality (SOC 316)
Social Welfare as a Social Institution (PAM 363)

Globalization and Inequality

As a global economy takes hold, there has been increasing concern that economic inequalities will grow apace, especially North-South inequalities between rich and poor countries. The countervailing "optimistic view" is that between-country disparities will in the long run wither away and render inequality an entirely internal, within-country affair. These and related lines of argumentation can be explored in courses that address such topics as trends in income inequality, theories of economic development, emerging patterns of international migration, and globalization and gender.

I. Overview Course (choose any one)

II. Controversies About Inequality (SOC 222, PAM 222, ECON 222, ILRLE 222, PHIL 195, and GOVT 222)
III. Possible Electives (choose any four):
- International Development (D SOC 205 and SOC 206)
- Economic Development (ECON 371)
- Labor Markets and Income Distribution in Developing Countries (ILRIR 635)
- Globalization and Inequality (SOC 320)
- Indigenous Peoples and Globalization (D SOC 325)
- Comparative Ethnic Stratification: Demographic Perspectives (D SOC 431 and D SOC 631)
- Global Perspectives on Gender (AS&RC 362)
- Sex and Gender in Cross-Cultural Perspective (ANTHR 321, 621, and FGSS 321, 631)
- Human Migration: Internal and International (D SOC 430)
- Gender and International Development (FGSS 614 and CRP 614)
- Politics of Transnationalism (GOVT 681)

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 as against this yardstick, and explores the larger role of values in popular and scholarly judgements about inequality.

I. Overview Course (choose any one)

II. Controversies About Inequality (SOC 222, PAM 222, ILROB 222, PHIL 195, and GOVT 222)

III. Possible Electives (choose any four):
- Organizations and Social Inequality (SOC 322 and ILROB 626)
- The Sociology of Markets (SOC 217)
- Sociology of Markets (ILROB 622 and SOC 622)
- Economic Security (ILRLE 340 and ECON 451)
- Employment Discrimination and the Law (ILRKB 684)
- Human Resource Economics and Public Policy (ILHR 360)
- Employee Relations and Diversity (ILHR 465)
- Social Welfare as a Social Institution (PAM 385)
- Applied Public Finance (PAM 204)
- Introduction to Policy Analysis (PAM 230)
- Critical Perspectives (PAM 240)
- Introduction to Policy Management (PAM 320)
- Intermediate Policy Analysis (PAM 330)
- Demography and Family Policy (PAM 371)
- Social Policy (SOC 326 and SOC 526)
- Social Policy (PAM 473)

Social Policy and Social Welfare (CRP 448 and CRP 548)
Policy Analysis: Welfare Theory, Agriculture, and Trade (ECON 430 and AFM 630)
Economic Analysis of the Welfare State (ILRLE 642 and ECON 460)
Families and Social Policy (HD 456)
Health and Social Behavior (HD 457 and SOC 457)
Public Policy and the African-American Urban Community (AS&RC 420)
Seminars: Beliefs, Attitudes, and Ideologies (PSYCH 489 and FGSS 488)
Feminist Jurisprudence (LAW 646)
Polical Economy of Education (EDUC 378)
Research on Education Reform and Human Resource Policy (ILHR 653)

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, and against this yardstick, and explores the larger role of values in popular and scholarly judgements about inequality.

I. Overview Course: Inequality, Diversity, and Justice (PHIL 193, SOC 293, CRP 293, and GOVT 293)

II. Controversies About Inequality (SOC 222, PAM 222, ILROB 222, PHIL 195, and GOVT 222)

III. Possible Electives:

A. Ethics Courses (choose two)

B. Social Science Classes (choose two)
Poverty and Economic Development

Over the last 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.

I. Overview Course (choose any one)

II. Controversies About Inequality (SOC 222, PAM 222, ILROB 222, PHIL 195, and GOVT 222)

III. Possible Electives (choose any four):
- Economic Development (ECON 371)
- Population and Development (D SOC 438 and SOC 437)
- International Justice (PHIL 448 and GOVT 492)
- Economics of Development (ECON 466 and AEM 660)
- Land Reform Old and New (D SOC 643)
- Issues in African Development (CRP 477 and CRP 677)
- Labor Markets and Income Distribution in Developing Countries (ILRIC 635)
- Global Perspectives on Gender (AS&RC 362)
- Population, Environment, and Development in Sub-Saharan Africa (D SOC 495)
- Gender and International Development (FGSS 614 and CRP 614)
- Politics of Transnationalism (GOVT 681)
- Economics of Malnutrition and Hunger (NS 457 and ECON 474)

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.

I. Overview Course (choose any one)

II. Controversies About Inequality (SOC 222, PAM 222, ILROB 222, PHIL 195, and GOVT 222)

III. Possible Electives (choose any four):
- Utopia in Theory and Practice (SOC 115)
- Social Movements (D SOC 511)
- Social Movements in American Politics (GOVT 302 and AM ST 302)
- Poor People's Movements (GOVT 456)
- Group Conflict and the Nation-State (SOC 531)
- Social Movements (SOC 660 and GOVT 660)
- Politics of Transnationalism (GOVT 681)
- Feminism Movements and the State (GOVT 353 and FGSS 353)

Comparative Labor Movements in Latin America (ILRCB 631)
Union Organizing (ILRCB 400)
Theories of Industrial Relations Systems (ILRCB 606)
Revitalizing the Labor Movement: A Comparative Perspective (ILRCB 652)
Women and Unions (ILRCB 384 and FGSS 384)
History of Resistance Movements in Africa and the Diaspora (AS&RC 283)
Latina Activism Feminist Theory (LSP 300)
Prisons (GOVT 314)

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.

I. Overview Course (choose any one)

II. Controversies About Inequality (SOC 222, PAM 222, ILROB 222, PHIL 195, and GOVT 222)

III. Possible Electives (choose any four):
- Introduction to Education (EDUC 101)
- Sociology of Education (EDUC 271)
- Education, Inequality, and Development (D SOC 305)
- Schooling and Society (SOC 357)
- Issues in Educational Policy (EDUC 370)
- Political Economy of Education (EDUC 378)
- The Politics of Education (GOVT 406)
- Research on Education Reform and Human Resource Policy (ILRHR 653)
- Education, Technology, and Productivity (ILRHR 695)
- Educational Finance (EDUC 664)
- Education in Africa and the Diaspora (AS&RC 459 and EDUC 459)
- Education and Development in Africa (AS&RC 502)

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.

A. General Courses

Introduction to American Studies: New Approaches to Understanding American Diversity, the Twentieth-Century (AM ST 110 and LSP 110)
Race and Ethnic Relations (SOC 204)
Race, Power, and Privilege in the United States (AS&RC 300)
History and Politics of Racialisation: A Comparative Study (AS&RC 304)
Sociology of Health and Ethnic Minorities (LSP 220 and D SOC 220)
Prisons (GOVT 314)
Minority Politics in the U.S. (GOVT 319 and LSP 319)
Concepts of Race and Racism (GOVT 377)
Comparative Ethnic Stratification: Demographic Perspectives (D SOC 431 and D SOC 631)
Race, Gender, and Organization (GOVT 415 and FGSS 415)
Employee Relations and Diversity (ILRHR 463)
Ethnicity and Identity Politics: An Anthropological Perspective (ANTHR 479)
Political Identity: Race, Ethnicity, and Nationalism (GOVT 610 and LSP 610)

B. Immigration and Ethnicity

Comparative Migration to the Americas (LSP 203, HIST 202, and AM ST 204)
Strangers and Citizens: Immigration and Labor in U.S. History (ILRRCB 302)
Immigration and Ethnic Identity (SOC 438 and AAS 438)
Human Migration: Internal and International (D SOC 430)
The Immigrant City: 1900–2000 (LSP 406, SHUM 406, AM ST 406, and HIST 412)
Immigration and the American Labor Force (ILRHR 469)
Immigration and Ethnicity in Twentieth-Century U.S. (HIST 201)
Immigration and Refugee Law (LAW 731)

C. Case Studies

African-American Social and Political Thought (AS&RC 231)
African-American Women in the Twentieth Century (HIST 212, AM ST 212, and FGSS 212)
African-American History from Slavery to Freedom (HIST 355)
The African-American Workers, 1910-The Present: Race, Work, and the City (HIST 376 and ILRRCB 386)
African-American Women in Slavery and Freedom (HIST 303, FGSS 307, and AM ST 303)
Public Policy and the African-American Urban Community (AS&RC 420)
Politics and Social Change in Southern Africa (AS&RC 484)
Global Africa: Comparative Black Experience (AS&RC 501)
Afro-American Historiography (HIST 610)
African-American Women (HIST 608)
Latinos in the United States (SOC 265, D SOC 265, and LSP 201)
Introduction to U.S. Latino History, Part I (LSP 260, HIST 260, and AM ST 259)
Introduction to U.S. Latino History, Part II (LSP 261, HIST 261, and AM ST 261)
Latina Activism Feminist Theory (LSP 300)
Latino Politics in the United States (LSP 306 and GOVT 306)
Introduction to Asian American Studies (AAS 110)
Asian American History (AAS 213 and HIST 213)
Asians in the Americas: A Comparative Perspective (AAS 305 and ANTH 303)
Introduction to American Indian Studies (AIS 100 and D SOC 100)
Indian America in the Twentieth Century (AIS 175 and D SOC 175)
Indians, Settlers, and Slaves in the Early South (AIS 329 and HIST 329)
Antisemitism and the Crisis of Modernity: From the Enlightenment to the Holocaust (HIST 459 and JWST 459)

The Family and Inequality
Although workers in modern labor markets are often analytically treated as independent individuals, they of course typically belong to families that pool the labor supply of their members, consume goods jointly, and serve in some circumstances as units of collective production. It might therefore be asked how the modern labor market has adapted to and evolved in the context of the family (and, conversely, how the family has responded to the market). The courses within this track explore such issues as the causes and consequences of the intrafamilial division of labor, the effects of marriage and family structure on careers, and the transmission of socioeconomic advantage from one generation to the next.

I. Overview Course (choose any one)

II. Controversies About Inequality (SOC 222, PAM 222, ILRROB 222, PHL 195, and GOVT 222)

III. Possible Electives (choose any four):
Work and Family (SOC 205 and FGSS 205)
Demography and Family Policy (PAM 371)
Families and Social Policy (HD 450)
Families and the Life Course (SOC 251 and HD 250)
Parent-Child Development in African-American Families (HD 458)
The Sociology of Marriage (SOC 309 and FGSS 309)

Seminar in Family Studies and the Life Course (HD 655)
Contemporary Family Theory and Research (HD 650)
Economics of Household Behavior (PAM 605)

INFORMATION SCIENCE

The Major
Information Science (IS) is an interdisciplinary field that explores the design and use of information systems in a social context; faculty members study 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. Information scientists examine 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 eleven 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 IS area-based tracks.

Requirements
Core (eleven courses)
1. Introductory (one course):
   - INFO 130 Introductory Design and Programming for the Web
2. Math and Statistics (four courses):
   - INFO 295 Mathematical Models for Information Science
   - MATH 111 Calculus I
   - either MATH 231 Linear Algebra or MATH 221 Linear Algebra and Differential Equations
   - either PSYCH 350 Statistics and Research Design or ENGRD 270 Basic Engineering Probability and Statistics (or equivalent)
3. Human-Centered Systems (two courses):
   - INFO 214 Cognitive Psychology
   - INFO 245 Psychology of Social Computing
4. Information Systems (two courses):
   - COM S 211 Computers and Programming
   - INFO 230 Intermediate Design and Programming for the Web
5. Social Systems (two courses):
   - either ECON 301 Microeconomics or ECON 313 Intermediate Microeconomic Theory
   - either INFO 292 Inventing an Information Society or INFO 355 Computers: From Babbage to Gates

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. Human-Centered Systems and Information Systems can be used as primary or secondary tracks. Social Systems can be used only as a secondary track. Courses taken to satisfy the core course requirements may not be used to fulfill the track requirements.

Additional information on Information Science courses can be found below and in the Computing and Information Science (CIS) section of Courses of Study. Course information for all other courses in the major can be found in the relevant departments (e.g., AEM, COM S, S&TS, etc.).

Human-Centered Systems

PSYCH 342 Human Perception: Applications to Computer Graphics, Art, and Visual Display
INFO 345 Human-Computer Interaction Design
PSYCH 347 Psychology of Visual Communications
PSYCH 380 Social Cognition
PSYCH 413 Information Processing: Conscious and Unconscious
PSYCH 416 Modeling Perception and Cognition
INFO 440 Advanced Human-Computer Interaction Design
INFO 450 Language and Technology
DEA 470 Applied Ergonomic Methods
* Students who take PSYCH 342 may also count its prerequisite, PSYCH 205, toward the Human-Centered Systems primary or secondary track requirements. Similarly, students who take PSYCH 380 may also count PSYCH 280 toward the Human-Centered Systems primary or secondary track requirements. At most, one of PSYCH 205 or PSYCH 280 can be counted toward the primary or secondary track requirements.

Information Systems
INFO 330 Applied Database Systems
LING 424 Computational Linguistics
INFO 430 Information Retrieval
INFO 451 Web Information Systems
COM S 432 Introduction to Database Systems
COM S 465 Computer Graphics I
COM S 472 Foundations of Artificial Intelligence
LING 474 Introduction to Natural Language Processing
OR&IE 474 Statistical Data Mining
COM S 478 Machine Learning
OR&IE 480 Information Technology
INFO 530 Architecture of Large-Scale Information Systems

Social Systems
SOC 304 Social Networks and Social Processes
AEM 322 Technology, Information, and Business Strategy
INFO 349 Media Technologies
INFO 355 Computers: From Babbage to Gates
ECON 368 Game Theory (formerly ECON 467)*
INFO 387 The Automatic Lifestyle: Consumer Culture and Technology (also S&TS 387)
LAW 410 Limits on and Protection of Creative Expression—Copyright Law and Its Close Neighbors
S&TS 411 Knowledge, Technology, and Property
ECON 419 Economic Decisions under Uncertainty
COMM 428 Communication Law
INFO 435 Seminar on Applications of Information Science
OR&IE 435 Introduction to Game Theory*
S&TS 438 Minds, Machines, and Intelligence
INFO 447 Social and Economic Data
ECON 476/477 Decision Theory I and II
INFO 515 Culture, Law, and Politics of the Internet

*Only one of OR&IE 435 and ECON 368 can be taken for IS credit.

Admission
All potential affiliates are reviewed on a case-by-case basis relative to the following criteria:

- Completion of four core courses, one in each of the core course areas listed above (i.e., Math and Statistics, Human-Centered systems, Information Systems, and Social Systems). Courses must be taken for a letter grade.
- A grade of C or better in each of the completed core courses with an overall GPA for these courses of 2.7 or more.

Courses used in the affiliation GPA computations may be repeated if the original course grade was below a C. The most recent course grade will be used for all repeated courses. Qualifying courses must be taken at Cornell.

Honors
To qualify for departmental honors, a student must have:

- maintained a cumulative GPA greater than or equal to 3.5;
- completed INFO 435, Seminar on Applications of Information Science;
- completed 6 additional credits of IS course work at or above the 500 level (graded courses only; no seminars or 2-credit project courses; these courses are in addition to the primary and secondary track requirements);
- completed 6 credits of INFO 490, Independent Study and Research, with an IS faculty member, spread over at least two semesters and with grades of A- or better. It is expected that the research pursued in INFO 490 will result in a project report.

The Concentration
A concentration in Information Science is also available to students in the College of Arts and Sciences. The concentration 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 concentration can be found in the CIS section of Courses of Study. Students are also referred to www.infosci.cornell.edu/ugrad/concentrations.html for the most up-to-date description of the concentration and its requirements.

Courses
For complete course descriptions, see the Information Science listings under Computing and Information Science (CIS).

INFO 130 Introductory Design and Programming for the Web (also COM S 130)
Fall. 3 credits.
INFO 214 Cognitive Psychology (also COGST 214, PSYCH 214)
Fall. 3 credits. Prerequisite: COGST 501, INFO 614, or PSYCH 614.
INFO 230 Intermediate Design and Programming for the Web (also COM S 230)
Spring. 3 credits. Prerequisite: COM S 130, INFO 130, or equivalent.

INFO 245 Psychology and Social Computing (also COMM 245)
Fall. 3 credits.
INFO 292 Inventing an Information Society (also ECE 298, ENGRG 298, HIST 292, S&TS 292)
Spring. 3 credits.
INFO 295 Mathematical Models for Information Science
Fall. 4 credits. Corequisite: MATH 231 or equivalent
INFO 330 Applied Database Systems (also COM S 330)
Fall. 3 credits. Prerequisites: COM S 211 or ENGRD 211.
INFO 345 Human-Computer Interaction Design (also COMM 345)
Spring. 3 credits.
INFO 349 Media Technologies (also COMM 349 and S&TS 349)
Spring. 3 credits.
INFO 355 Computers: From Babbage to Gates (also S&T 355)
Spring. 4 credits.
INFO 387 The Automatic Lifestyle: Consumer Culture and Technology (also S&T 387)
Spring. 4 credits. Not offered spring 2005.
INFO 430 Information Retrieval (also COM S 430)
Fall. 3 credits. Prerequisite: COM S 211, ENGRD 211, or equivalent.
INFO 431 Web Information Systems (also COM S 431)
Spring. 3 credits. Prerequisites: COM S 211 and some familiarity with the technology of Web sites.
INFO 435 Seminar on Applications of Information Science (also INFO 635)
Spring. 3 credits. Prerequisites: background in computing, data structures, and programming at the level of COM S 211 or equivalent, and experience in using information systems.
INFO 440 Advanced Human-Computer Interaction Design (also COMM 440)
Fall. 3 credits.
INFO 447 Social and Economic Data (also ILR 447)
Spring. 4 credits. Prerequisites: one semester of calculus, the IS statistics requirement, at least one upper-level social-science course, or permission of the instructor.
INFO 450 Language and Technology (also COMM 450)
Spring. 3 credits.
INFO 490 Independent Reading and Research
Fall, spring. 1–4 credits.
INFO 491 Teaching in Information Science, Systems, and Technology
Fall. Spring. Variable credit.
INFO 515 Culture, Law, and Politics of the Internet
Fall. 4 credits.
INFO 530  The Architecture of Large-Scale Information Systems (also COM S 530)  
Spring, 4 credits. Prerequisites: COM S INFO 330 or COM S 432.

INFO 614  Cognitive Psychology (also PSYCH 614)  
Fall, 5 credits. S. Edelman. This course consists of two components: PSYCH 214 (3 credits) and COGST 501 (2 credits). It is intended for graduate students; undergraduates opting for 5 credits should enroll simultaneously in PSYCH 214 and COGST 501.

INFO 630  Representing and Accessing Digital Information (also COM S 630)  
Fall, 4 credits. Prerequisites: COM S 472 or 478 or 578 or the equivalent.

INFO 634  Information Technology in Sociocultural Context (also S&T S 634)  
Fall, 4 credits. Prerequisite: permission of instructor.

INFO 635  Seminar on Applications of Information Science (also INFO 435)  
Spring, 3 credits. Prerequisites: background in computing, data structures, and programming at the level of COM S 211 or equivalent, and experience in using information systems. Undergraduates and masters students should register for INFO 435. Ph.D. students should register for INFO 635.

INFO 640  Human-Computer Interaction Design (also COM S 640)  
Fall, 3 credits. Prerequisite: graduate standing or permission of instructor.

INFO 685  The Structure of Information Networks (also COM S 685)  
Spring, 4 credits. Prerequisite: COM S 482.

INTERNATIONAL RELATIONS CONCENTRATION  
D. R. Lee (AEM), director; Faculty Advisory Board: M. Cook (Public Administration and Government); S. Feldman (Rural Sociology); J. Reppy (S&T S); B. Strauss (History); K. Grace (Associate Director, Cornell Abroad)

Objective  
The International Relations Concentration is an interdisciplinary program for undergraduate students enrolled in any of the seven Cornell undergraduate colleges. The International Relations Concentration provides a structured yet flexible program for 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 non-governmental organizations, in cross-cultural affairs, in journalism, and in education.

The International Relations Concentration is not a major or a department, but rather a program offering a selection of courses reaching across colleges and departments. Students pursue the International Relations Concentration 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 these 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 concentration requirements, 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, including:

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 identified as “core” or “elective.” Students must complete altogether 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 concentration requirements must be taken for a letter grade. Courses can count both toward a major and the International Relations Concentration.

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 additional elective from either Group 1 or Group 2—one elective from Group 3 and 4, and one additional elective from either Group 3 and 4.

Prior to 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 156 Uris Hall. Students should take note that these lists are not necessarily complete. Other courses throughout the university qualify for the International Relations Concentration by prior arrangement.

Language Requirement  
Students in the IR concentration 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); 2) two languages at proficiency.

Study Abroad  
Students in the IR concentration 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 prior to departure.

Completion  
Transcripts will reflect successful completion of the requirements for the concentration. In addition, students will receive a special certificate and a letter of confirmation signed by the director of the International Relations Concentration 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, 156 Uris Hall, 254-5004.

Course List for 2004–2005  
Course options are listed below. Most courses offered one semester only. Course offerings may change, so see the administrative coordinator, course roster, and IR web site for further details.

Group 1: International Economics and Development  
Core:  
ECON 230/AEM 230 International Trade and Finance  
AEM 429 International Finance  
AEM 430 International Trade Policy  
ECON 361 International Trade Theory  
ECON 362 International Monetary Theory and Policy  
Electives:  
ECON 371 Economic Development  
ECON 450/AEM 450 Resource Economics  
ECON 471 Economics of the Former USSR and Central Europe  
ECON 472 Comparative Economic System: East and West  
ECON 475 Economy of India  
AEM 432 Business and Governments in Global Marketplace  
AEM 435/CRP 412 Development, Privatization, and New Public Management  
CRP 477 Issues in African Development  
GOVT 350/IRLC 355 Politics of the Global North  
GOVT 354 Capitalism, Competition, and Conflict

Group 2: World Politics and Foreign Policy  
Core:  
GOVT 181 Introduction to International Relations  
Electives:  
GOVT 326 Building a Better Democracy
GOVT 329 Comparative Politics of Latin America
GOVT 341/NEST 294/ JWST 294 Modern European Society and Politics
GOVT 343 Politics of European Integration
GOVT 353 Recent East Asian Politics
GOVT 358 History of Modern Middle East
GOVT 365 Politics and Culture
GOVT 400 Democracies in the International System
GOVT 400 Conflict and Cooperation in Transnational Relations
GOVT 426 Colonialism and Post-Colonialism
AS&RC 451 Political and Social Change in Caribbean
HIST 214/AM ST 214 American Foreign Policy
HIST 308 Post-War Germany
HIST 371 World War II in Europe
HIST 414 Motivations of U.S. Foreign Policy

**Group 3: Transnational Processes and Policies**

**Core:**
- GOVT 294/PHIL 294 Global Thinking
- GOVT 393 Introduction to Peace Studies

**Electives:**
- AEM 432 Business and Governments in Global Marketplace
- COMM 424 Communications in Developing Nations
- CRP 380 Environmental Politics
- CRP 384 Green Cities
- CRP 395 Gender and Globalization
- CRP 451 Environmental Law
- CRP 453 Environmental Aspect of International Planning
- GOVT 400 Development and Environment
- GOVT 403 International Environmental Politics and Law
- GOVT 460 Just Toward Indigenous Peoples
- HD 483 Early Care and Education in Global Perspective
- ILRCB 302 Immigration and Labor in U.S.
- ILRHR 456 International Human Resource Management
- ILRHR 465 Globalization of Services
- INTAG 300 Perspectives in International Agricultural and Rural Development
- NTRES 407 Religion, Ethics, and the Environment
- NTRES 411 Seminar in Environment Ethics
- SOC 324/D SOC 324 Environment and Society
- SOC 437/D SOC 438 Population and Development
- S&TS 442/SOC 442/CRP 442 The Sociology of Science

**Group 4: Cultural Studies**

**Core:**
- ANTH 102 Introduction to Anthropology: The Comparison of Cultures
- ANTH 200 Cultural Diversity and Contemporary Issues

**Electives:**
- ANTH 230/AS 230 Cultures of Native North America
- ANTH 260 Japanese Popular Culture
- ANTH 303 Asians in the Americas
- ANTH 321/FGSS 321 Sex and Gender in Cross-Cultural Perspective
- ANTH 384 Africa in the Global Economy
- ANTH 387 Comparative Islamic Movements
- ANTH 388 Masks of Power/Strategies of Resistance
- ANTH 441 Himalayan Ethnographies
- ART H 245 Renaissance and Baroque
- ART H 368/LSP 368 Modern and Contemporary Latin American Art
- ART H 378/AS&RC 310 Art in African Culture and Society
- ART H 384/ASIAN 381 Introduction to the Arts of Japan
- ART H 408 Tuscany as a New Jerusalem
- ART H 450 Women in Renaissance
- AS&RC 290 The Sociology of African-American Experience
- AS&RC 404 Afrocentricity: Paradigms and Critical Readings
- AS&RC 459 Education in Africa and Diaspora
- AS&RC 463 Islam in Global Africa
- ASIAN 191 Introduction to Modern Asian History
- ASIAN 211 Introduction to Japan
- ASIAN 215 Introduction to South Asian Civilization
- ASIAN 245/MUSIC 245 Gamelan in Indo Culture
- ASIAN 293 History of China Up to Modern Times
- ASIAN 312 Intellectuals of Early Modern Korea
- ASIAN 357 Chinese Religions
- ASIAN 373 Twentieth-Century Chinese Literature
- ASIAN 385 History of Vietnam
- ASIAN 388 Race and Gender-Asian History and Literature
- ASIAN 406 The Sacred in Secular India
- ASIAN 444 Youth in Japanese Literature and Culture
- COM L 234 Muslims and Jews
- COM L 279/RUSSL 279 Russian Connection 1830-1867
- COM L 304 Europe and Its Others
- COM L 348 Shakespeare and Europe
- COM L 363 The European Novel
- COM L 368 Visual Culture and Social Theory
- ENGL 209 Introduction to Cultural Studies
- ENGL 274 Scottish Literature
- FGSS 246/SPANL 246 Contemporary Narratives by Latina Writers
- FILM 393 International Film of the 70s
- FILM 450/COM L 453 Rescreening the Holocaust
- FRLIT 220 French and Francophone Culture
- FRLIT 221 Modern French Literature
- FRLIT 224/HIST 270 The French Experience
- HIST 151 Introduction to Western Civilization
- HIST 191/ASIAN 191 Introduction to Modern Asian History
- HIST 195 Colonial Latin America
- HIST 241 and Revolution in Nineteenth-Century Africa
- HIST 253/NEST 255/RELST 255 Introduction to Islamic Civilization
- HIST 281/NEST 281 Sciences in Western Civilization
- HIST 288/NEST 294 History of the Modern Middle East
- HIST 308 Post-War Germany
- HIST 371 World War II in Europe
- HIST 462 Popular Culture in European History
- HIST 486/AM ST 486 Seminar on the 1960s
- HIST 487 Seminar on Thailand
- HIST 492/ASIAN 492 Medieval Chinese History
- HIST 493 Problems in Modern Chinese History
- ITAL 216 Introduction to Italian Literature
- ITAL 389 Modern Italian Novel
- KRLIT 405 Readings in Korean Literature
- NES 234/RELST 234/JWST 234 Muslims and Jews
- NES 293/JWST 294 Middle Eastern Cinema
- NES 298/RELST 201 Issues in Catholic Thought
- NES 393/RELST 393/JWST 393 Jews and Christians in Modern Middle East
- NES 395/JWST 395 Israeli Society
- RUSSL 335 Gogol
- RUSSL 369 Dostoevsky
- SPANL 218 Introduction to Hispanic Literature
- SPANL 301 Hispanic Theater Production
- SPANL 319 Renaissance Hispanism
- SPANL 323 Approaches to Spanish Culture
- THETR 240 Introduction to World Theatre 1

**ITALIAN**

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. Adelson (German-Jewish Literature and Culture), E. Alfonso (Hebrew and Semitic Studies), D. Bathrick (Holocaust Film Studies), R. Brann (Judeo-Islamic Studies), N. Brisch (Akkadian), M. Campos (Modern Middle Eastern History), V. Caron (Modern French and European-Jewish History), M. Diesing (Yiddish Language and Linguistics), N. Furman (French Holocaust Literature), K. Haines-Eitzen (Early Judaism and Early Christianity), E. Hamori (Biblical Studies), M. Hnaraki (Modern Greek Language), P. Hobendahl (German Literature), R. Hoffmann (Holocaust Studies), P. Hyams (Medieval Jewish History), G. Kadish (Ancient History, Egypt), D. LaCapra (Holocaust Studies), M. Migiel (Italian Literature), R. Polenberg (American-Jewish History), J. Porte (American-Jewish Writers), D. Powers (Islamic History and Law), E. Rosenberg (Emeritus), N. Scharf (Hebrew Language), J. Schuld (Catholic Studies), D. Schwarz (Anglo-Jewish Literature), G. Shapiro (Russian-Jewish Literature), S. Shoer (Hebrew Language), T. Sorek (Sociology and Anthropology), D. Starr (Modern Hebrew and Arabic Literature; Critical Theory; Middle Eastern Film), M. Steinberg (German Jewish History and Culture), P. Stevens (curator), V. Szekely (Emeritus), S. M. Toorawa (Arabic Language), J. Zorn (Biblical Archaeology).

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 Judeo-Christian 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.

**Courses Offered**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JWST 101-102</td>
<td>Elementary Modern Hebrew I and II (also NES 101-102)</td>
<td>101 fall; 102 spring</td>
<td>4 credits</td>
</tr>
<tr>
<td>JWST 103-200</td>
<td>Intermediate Modern Hebrew I and II (also NES 103-200)</td>
<td>103 fall; 200 spring</td>
<td>3 credits</td>
</tr>
<tr>
<td>JWST 123-124</td>
<td>Introduction to Biblical Hebrew I and II (also NES 123-124, RELST 123-124)</td>
<td>123 fall; 124 spring</td>
<td>3 credits each term</td>
</tr>
<tr>
<td>JWST 223</td>
<td>Introduction to the Bible (also NES 223 and RELST 223)</td>
<td>Spring</td>
<td>3 credits</td>
</tr>
<tr>
<td>JWST 234</td>
<td>Muslims and Jews in Confluence and Conflict (also NES 234 and RELST 234)</td>
<td>Fall</td>
<td>3 credits. Not offered 2004-2005. R. Brann. For description, see NES 234.</td>
</tr>
<tr>
<td>JWST 239</td>
<td>Cultural History of the Jews of Spain (also COM L 239, NES 239, and RELST 239)</td>
<td>Spring</td>
<td>3 credits</td>
</tr>
<tr>
<td>JWST 252</td>
<td>Modern European Jewish History, 1789-1948 (also HIST 291)</td>
<td>Fall</td>
<td>4 credits. Not offered 2004-2005. V. Caron. For description, see HIST 291.</td>
</tr>
<tr>
<td>JWST 254</td>
<td>Anti-Semitism and the Crisis of Modernity: From the Enlightenment to the Holocaust (also HIST 235)</td>
<td>Spring</td>
<td>4 credits. Not offered 2004-2005. V. Caron. For description, see HIST 235.</td>
</tr>
<tr>
<td>JWST 256</td>
<td>Introduction to the Quran (also NES 256/655, RELST 213/656, COM L 256)</td>
<td>Spring</td>
<td>3 credits. Not offered 2004-2005. M. Toorawa. For description, see NES 256.</td>
</tr>
<tr>
<td>JWST 257</td>
<td>Ethics of Imagining Holocaust (also GERST 221, ENGL 221)</td>
<td>Fall</td>
<td>4 credits. Not offered 2004-2005. D. Schwartz. For description, see ENGL 221.</td>
</tr>
<tr>
<td>JWST 266</td>
<td>Jerusalem Through the Ages (also RELST 266, NES 266, and ARKEO 266)</td>
<td>Fall</td>
<td>3 credits</td>
</tr>
<tr>
<td>JWST 268</td>
<td>Ancient Egyptian Civilization (also ARKEO 268 and NES 268)</td>
<td>Fall</td>
<td>3 credits. M. Campos. For description, see NES 268.</td>
</tr>
<tr>
<td>JWST 273</td>
<td>History of the Middle East: Thirteenth through Eighteenth Centuries (also HIST 275 and NES 273)</td>
<td>Fall</td>
<td>3 credits. M. Campos. For description, see NES 273.</td>
</tr>
<tr>
<td>JWST 274</td>
<td>History of the Modern Middle East: Nineteenth and Twentieth Centuries (also HIST 276 and NES 274)</td>
<td>Spring</td>
<td>3 credits. M. Campos. For description, see NES 274.</td>
</tr>
<tr>
<td>JWST 290</td>
<td>History of Zionism and the Birth of Israel (also NES 290, HIST 267)</td>
<td>Spring</td>
<td>4 credits. Not offered 2004-2005. V. Caron. For description, see HIST 267.</td>
</tr>
<tr>
<td>JWST 291</td>
<td>Sophomore Seminar: Middle Eastern Cinema (also NES 293, FILM 293, COM L 293, and VISST 293)</td>
<td>Fall</td>
<td>3 credits. Limited to 15 students. Not offered 2004-2005. D. Starr. This is a special seminar sponsored by the John S. Knight Institutes Sophomore Seminars Program. Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the disciplines outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors. For description, see NES 293.</td>
</tr>
</tbody>
</table>
ARTS AND SCIENCES - 2004-2005

[JWST 294 History of the Modern Middle East, Eighteenth to Twentieth Centuries (also NES 294 and GOVT 358)]
For description, see NES 294.

[JWST 295 Introduction to Christian History (also RELST 295, NES 295, HIST 299)]
For description, see NES 295.

[JWST 301-302 Advanced Modern Hebrew I and II (also NES 301-302)]
301, fall; 302, spring. 4 credits. N. Scharf.
For description, see NES 301-302.

[JWST 305 Conversational Hebrew (also NES 305)]
Fall. 2 credits. Limited to 15 students. Prerequisite: NES 302 or permission of instructor, for non-native speakers only. N. Scharf.
For description, see NES 305.

[JWST 339 Islamic Spain: Culture and Society (also JWST 639, RELST 334/639, SPANL 339/639, COM L 334/639, NES 339)]
Spring. 4 credits. R. Brain.
For description, see NES 339.

[JWST 352 History of the Holocaust (also HIST 370)]
Fall. 4 credits. Not offered 2004–2005. V. Caron.
For description, see HIST 370.

[JWST 360 Ancient Iraq I: Origins of Mesopotamian Civilization (also NES 360, ARKEO 360)]
For description, see NES 360.

[JWST 361 Sumerian Language and Culture I (also NES 361, ARKEO 361)]
For description, see NES 361.

[JWST 362 Sumerian Language and Culture II (also NES 362)]
Fall. 4 credits. D. I. Owen.
For description, see NES 362.

[JWST 363 Sumerian III (also NES 363 and ARKEO 363)]
Spring. 4 credits. Prerequisite: NES 362. D. I. Owen.
For description, see NES 363.

[JWST 365 Ancient Iraq II: From the Beginning of the Second Millennium to the Conquest of Alexander the Great (also ARKEO 363 and NES 363)]
Spring. 4 credits. D. I. Owen.
For description, see NES 365.

[JWST 385 Middle Eastern Cities: History, Society, and Culture (also HIST 382 and NES 385)]
Fall. 4 credits. M. Campos.
For description, see NES 385.

[JWST 388 The Jews in and out of Egypt (also NES 388 and COM L 388)]
For description, see NES 388.

[JWST 389 Sociology of Sport (also NES 389 and SOC 330)]
Fall. 4 credits. T. Sorek.
For description, see SOC 330.

[JWST 393 History of Jews and Christians in the Modern Middle East (also NES 393)]
For description, see NES 393.

[JWST 394 Gender, Sexuality, and the Body in Early Christianity (also NES 394, FGSS 394, RELST 394)]
For description, see NES 394.

[JWST 395 Israeli Society (also NES 395 and SOC 390)]
Spring. 4 credits. T. Sorek.
For description, see NES 395.

[JWST 397 History of the Israeli-Palestinian Conflict (also NES 397 and GOVT 397)]
Fall. 4 credits. T. Sorek.
For description, see NES 397.

[JWST 400 Seminar in Advanced Hebrew (also NES 400)]
For description, see NES 400.

[JWST 401 Topics in Modern Hebrew Literature (also NES 401)]
For description, see NES 401.

[JWST 409 Season of Migration (also NES 409, RELST 409)]

[JWST 420 Readings in Biblical Hebrew Prose (also NES 420, RELST 420)]
For description, see NES 420.

[JWST 423 Sacred Fictions (also NES 423, RELST 411, COM L 411, CLASS 461 and SOC H 411)]
For description, see NES 423.

[JWST 424 Hebrew Bible in the Middle Ages (also NES 424 and RELST 424)]
Spring. 4 credits. E. Alfonso.
For description, see NES 424.

[JWST 446 History of Jews in Modern France (also HIST 417, FRITL 414)]
Fall. 4 credits. Not offered 2004–2005. V. Caron.
For description, see HIST 417.

[JWST 453 History of Modern German Jewry: From the Enlightenment to the Post-1945 Era (also HIST 433, GERST 433)]
For description, see HIST 433.

[JWST 456 History of Women and Gender in the Modern Middle East (also NES 456, GOVT 484, and FGSS 456)]
For description, see NES 456.

[JWST 458 Imagining the Holocaust (also JWST 458, ENGL 458/658, GERST 457/657)]
For description, see ENGL 458.

[JWST 474 Topics in Modern Europe: Intellectual and Cultural History (also JWST 674, HIST 474/673, COM L 474/673)]
Spring. 4 credits. D. LaCapra.
For description, see HIST 474.

[JWST 478 Jewish-American Writing (also AM ST 473, ENGL 479)]
For description, see ENGL 479.

[JWST 491-492 Independent Study—Undergraduate]
Fall and spring. Variable credit. Staff.

[JWST 493 Cosmopolitan Alexandria (also S HUM 411, NES 493, COM L 406)]
For description, see NES 493.

[JWST 499 Independent Study—Honors]
Fall and spring. 8 credits. Staff.

[JWST 658 Imagining the Holocaust (also JWST 458, ENGL 458/658)]
For description, see ENGL 458/658.

Courses not offered 2004–2005

JWST 197 Introduction to the Near Eastern Civilization (also NES 197 and RELST 197)

JWST 236 Israel: Literature and Society (also NES 236)

JWST 248 Introduction to Classical Jewish History (also RELST 248 and NES 248)

JWST 255 Women and the Holocaust (also ENGL 252, FGSS 252)

JWST 261 Ancient Seafaring (also NES 261, ARKEO 275)

JWST 271 Yiddish Linguistics (also LING 241)

JWST 299 The Hebrew Bible and the Arabic Quran in Comparative Perspective (also NES 299, RELST 299, COM L 299)

JWST 323 Reinventing Biblical Narrative Apocrypha and Pseudepigrapha (also NES 323, RELST 323)

JWST 328 Gnosticism and Early Christianity (also NES 328, RELST 330)

JWST 344 The History of Early Christianity (also NES 324, CLASS 344 and RELST 325)

JWST 366 The History and Archaeology of the Ancient Near East (also NES 366, ARKEO 366)

JWST 371 A Mediterranean Society and Its Culture: The Jews under Classical Islam (also NES 371, RELST 371, COM L 371)

JWST 435 Aramaic (also NES 435)

JWST 449 Rescreening the Holocaust (also GERST 449, COM L 453, THETR 450)
JOHN S. KNIGHT INSTITUTE FOR WRITING IN THE DISCIPLINES

The director of the John S. Knight Institute is Jonathan M. Cohen, dean of the College of Arts and Sciences, professor in the Department of Comparative Literature, and George Elliott Reed Professor of Writing and rhetoric. Katherine Gottschalk, senior lecturer in the Department of English, is the Walter C. Teague Director of First-Year Writing Seminars. The institute's offices are in 101 McGraw Hall, 255-4061.

S. Donatelli (Sophomore Seminars Program), M. Gilliland (Writing Workshop), K. Hjortshoj (Writing in the Majors), J. Kuszai (Study in English), B. LeGendre (Writing in the Majors), J. Martin (Writing Workshop), P. Pierpoint (Writing Workshop), E. Shapiro, (Writing Workshop).

The John S. Knight Institute helps to coordinate the teaching of writing in all undergraduate schools and colleges (the School of Industrial and Labor Relations, the School of Hotel Administration; and the colleges of Agriculture and Life Sciences; Architecture, Art, and Planning; Arts and Sciences; Engineering; and Human Ecology). The program administers writing seminars for first-year and upperclass students, discipline-based seminars in its Sophomore Seminars Program, tutorial writing classes, and seminars in the teaching of writing. More than thirty 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 intensive 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 require at least six—and at most nine—formal essays on new topics. (While these assignments should total about 30 pages, some of the 30-page total may include major drafts that receive commentary from the instructor and are later significantly revised.) Assignments form a logical sequence.
- At least three of the 6-9 required essays are developed through several stages of revised drafts under the instructor's guidance. Guidance may include, in addition to written commentary on drafts, individual conferences, in-class group work, peer commentary, writing responses, journals, and so on.
- Ample classroom time is spent on work directly related to writing.
- Reading assignments in the course subject are kept under 75 pages per week to permit regular, concentrated work on writing.
- All students meet at least two individual conferences with the instructor.

Seminars pursue this common aim through thirty academic departments and programs across the College of Arts and Sciences and through its Sophomore Seminars Program. The program involves a range of disciplines across the College of Arts and Sciences and the university. Building on an introductory exposure to discipline-specific approaches to writing gained by students in their two required First-Year Writing Seminars, the Sophomore Seminars provide interested students with an early mentoring experience in a small forum with leading university professors. Seminar enrollment is limited to 15 students. The program is intended to prepare sophomores for the more advanced
and increasingly specialized work they will undertake in their chosen fields as juniors and seniors. Each Sophomore Seminar is presented in an interdisciplinary context, and each may serve as a gateway to a particular major. The institute projects a full roster of 30 Sophomore Seminars by academic year 2005–2006. By the end of the present academic year, the Knight Institute already will have sponsored the following 41 seminars from 25 disciplines:

### Knight Institute Sophomore Seminars 2001–2005

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>AAS 210</td>
<td>South Asian Diasporic Locations</td>
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<tr>
<td>AAS 211*</td>
<td>Race and the American City: Reading New York and San Francisco</td>
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<tr>
<td>AEM 200*</td>
<td>Contemporary Controversies in the Global Economy</td>
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<tr>
<td>ANTHR 211*</td>
<td>Nature and Culture</td>
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<tr>
<td>ART 372*</td>
<td>Contemporary Art: Making and Looking</td>
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<tr>
<td>ASTRO 233</td>
<td>From Planets to Galaxies: The Origin of Cosmic Structures</td>
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<tr>
<td>BIOEE 467*</td>
<td>Why is Evolutionary Biology So Controversial?</td>
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<tr>
<td>CLASS 244*</td>
<td>Psyche, Ego, and Self</td>
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<tr>
<td>COM L 215</td>
<td>Comparative American Literatures</td>
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<tr>
<td>COM L 225*</td>
<td>Poetry and Poetics of Difference</td>
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<tr>
<td>COM L 227*</td>
<td>Multilingualism</td>
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<tr>
<td>CSS 200</td>
<td>Soils and Civilizations</td>
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<tr>
<td>DANCE 204</td>
<td>Seminar in Dance Studies: Movement in Time and Space</td>
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<tr>
<td>ENGL 204*</td>
<td>Introduction to American Literatures: Narrating the Nation</td>
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<td>ENGL 209*</td>
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<td>ENGL 220*</td>
<td>The Idea of the Pet in Literature</td>
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<td>ENGL 221*</td>
<td>Imagining the Holocaust</td>
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<td>ENGL 244</td>
<td>Studies in Irish Culture</td>
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<td>ENGL 252</td>
<td>Late Twentieth-Century Women Writers and Visual Culture</td>
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<tr>
<td>FD SC 230</td>
<td>Functional Foods: Where Food Science and Nutrition Meet</td>
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<td>GOVT 215</td>
<td>Gender, Nationalism, and War</td>
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<td>GOVT 226</td>
<td>Empires</td>
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<td>HIST 207</td>
<td>The Occidental Tourist: Travel Writing and Orientalism in Southeast Asia</td>
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<tr>
<td>HIST 211</td>
<td>Black Religious Traditions: Sacred and Secular</td>
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<tr>
<td>HIST 225*</td>
<td>U.S. Mexico Border: History, Culture, and Representation</td>
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<tr>
<td>HIST 232*</td>
<td>Eyewitness to War in the Ancient World</td>
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<tr>
<td>HIST 241*</td>
<td>Riot and Revolution in Nineteenth-Century Africa</td>
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<tr>
<td>HORT 215</td>
<td>Non-Fiction Adventure Writing: Reclaiming the Scientist’s Voice</td>
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<tr>
<td>ITAL 250*</td>
<td>The Uses of Learning</td>
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<td>LA 215</td>
<td>Engaging Places</td>
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<td>LING 212</td>
<td>Language and Culture</td>
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<td>MUSIC 270</td>
<td>Music in American Cultures</td>
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<td>MUSC 300*</td>
<td>Proseminar in Musicology</td>
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<td>NES 293*</td>
<td>Middle Eastern Cinema</td>
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<td>NES 296*</td>
<td>Jesus in History, Tradition, and the Cultural Imagination</td>
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<tr>
<td>PHIL 216*</td>
<td>Self, Ego, Psyche</td>
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<td>PSYCH 231</td>
<td>Topics in Cognitive Science: Mind and Reality in Science Fiction</td>
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<tr>
<td>SRTS 212</td>
<td>Sound Studies</td>
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<tr>
<td>SPANL 230*</td>
<td>Viewing Modern Barcelona</td>
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<td>THETR 202*</td>
<td>Film Style and Cinema Experience: Fritz Lang and Martin Scorsese</td>
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<tr>
<td>THETR 203</td>
<td>Shakespeare in (Con)text</td>
</tr>
</tbody>
</table>

### Writing in the Majors

Spanning the humanities, social sciences, and sciences, the Knight Institute’s upper-level Writing in the Majors courses do not satisfy formal writing requirements, and faculty participation is entirely voluntary. While all Writing in the Majors courses include extensive writing, usually with guided revision, they also emphasize other forms of active, interactive learning essential to scholarship and careers in the disciplines. Writing in the Majors initiatives have included individual and collaborative research projects, collaborative writing, oral presentations, group or oral exams, field studies, authentic student-designed laboratory experiments, debates, analytical and critical reading exercises, topical symposia, conversation groups, student-led discussions, poster sessions, and many kinds of informal writing, including online exchanges. Varying radically in design and size, from enrollments of fewer than 10 students to more than 300, Writing in the Majors courses over the past seventeen years have involved collaboration with 120 faculty members and more than 200 graduate teaching assistants to enrich learning in 75 upper-level courses offered in 22 departments.

#### WRIT 701 Writing in the Majors Seminar
Fall and spring, 1 credit. S/U grade 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 700 Teaching Writing

Summer and fall. 1 credit. S/U grade only. Teaching Writing introduces new instructors of Cornell’s First-Year Writing Seminars to the challenges of teaching writing in courses that both introduce students to particular fields of study and develop the sophisticated writing skills students will need throughout their undergraduate careers and beyond. An overview of methodologies involved in the teaching of writing within a disciplinary context is provided by readings representing a range of pedagogical theories and practices, seminar discussions, and presentations of faculty, visiting scholars in the field, and experienced Ta’s. Participants in the course prepare written assignments designed to prepare them for the actual work of their First-Year Writing Seminars. In addition, written critiques and explanatory rationales of those assignments provide an opportunity for reflection on the methods chosen and on the principles underlying them.

### 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 137 and 138 are graded S-U only, and students receiving a grade of S are granted credit toward their college writing requirements. Students who think this course might be appropriate including non-native speakers of English scoring less than 600 on the Test of English as a Foreign Language (TOEFL) should attend the assessment sessions offered by the Writing Workshop during orientation week each fall. The Workshop also offers a Walk-In Service (see below) to help students work on writing assignments. The director is Joe Martin, senior lecturer in the Writing Workshop. The Workshop offices are in 174 Rockefeller Hall, 255-6349.

### The Walk-In Service

Through the Walk-In Service, the Writing Workshop offers tutoring assistance in writing to any student who needs help with a writing project. The Walk-In Service has tutors available during the academic year in 174 Rockefeller and North and West Campus residential areas. The director is Mary Gilliland. For information contact the Writing Workshop, 174 Rockefeller Hall, 255-6349.

WRIT 137–138, 134 An Introduction to Writing in the University

137, fall, 138, spring, 134, summer. 3 credits each term. Each section limited to 12 students in the fall and spring, 6 students in the summer. S/U grade only. Prerequisite: permission of instructor. This writing seminar is designed for students who need more focused attention to master the expectations of academic writing. The course emphasizes the analytic and argumentative writing and critical reading essential for university-level work. With small classes and weekly student/teacher conferences, each section is shaped to respond to the needs of students in that particular class.

WRIT 139 Special Topics in Writing

Fall and spring. 3 credits. S/U grades only. Undergraduate students only. Cannot fulfill any writing or distribution requirements. Prerequisite: permission of instructor. These courses allow students the opportunity to resolve significant writing challenges that have interfered with their academic progress. Students must have ongoing writing projects on which to work. Instruction is in weekly tutorials. Interested students should go to 174 Rockefeller for more information.
WRIT 702 Graduate Writing Workshop
Fall and spring. 3 credits. Graduate students only. Each section is limited to ten students. S-U grade only. Prerequisite: permission of the instructor. This course gives graduate students the opportunity to resolve significant writing challenges that have interfered with their academic progress. Students must have ongoing writing projects to work on. Instruction is in weekly tutorials. Interested students should come to 174 Rockefeller for further information.

WRIT 703 Work in Progress
Fall and spring [not offered in spring 2005]. 3 credits. Graduate students only. Each section is limited to ten students. S-U grade only. Prerequisite: permission of the instructor.
A writing seminar for graduate students who have substantial work in progress, such as professional articles, theses, or dissertations. In the first two weeks we will discuss rhetorical and stylistic features of scholarly writing and methods of composing and revising, with relevant readings. Remaining weeks will emphasize exchange and discussion of drafts, supplemented by individual conferences. The course goal is the improvement and completion of student writing projects.

KHMER (CAMBODIAN)
See Department of Asian Studies.

KOREAN
See Department of Asian Studies.

LATIN AMERICAN STUDIES
190 Uris Hall
The Latin American Studies Program encourages and coordinates faculty and student interests in Latin America and the Caribbean. A variety of special lectures, films, and seminars supplement the regular course offerings. Graduate students may pursue a minor in Latin American Studies, while majoring in the field of their choice.

Undergraduate Concentration
Undergraduate students may fulfill a Latin American Studies Concentration by completing a minimum of 15 credits in Latin American Studies courses combined with language proficiency in Quechua, Spanish, or Portuguese. Latin American courses are offered in the College of Agriculture and Life Sciences; the College of Architecture, Art, and Planning; the College of Arts and Sciences; the College of Human Ecology; the School of Hotel Administration; and the School of Industrial and Labor Relations.
For further information and a current course listing, students should contact the program office at 255-3345 or visit 190 Uris Hall.

Latin American Studies Core Courses
It is strongly recommended that undergraduate concentrators take the interdisciplinary core course, SPANL 320/LASP 301/HIST 301 Perspectives on Latin America.
Particular attention is drawn to the following courses that students have taken in the past to complete requirements for the undergraduate concentration or the graduate minor. Other courses may be substituted with the approval of the adviser.

AM ST
219 Mexican Immigration to the U.S. (LASP 215)
226 Migrations, Cultures and Nation (LASP 226)

ANTHR
204 Ancient Civilizations (LASP 201)
221 Ethnographies of Latino Culture (LASP 221)
255 Great Empires of the Andes (LASP 255)
333 Ethnology of the Andean Region (LASP 333)
340 Perspectives on Latin America (LASP 301)
346/646 The Kayapo of Brazil (LASP 344/644)
355 Archaeology of Mexico and Central America (LASP 355)
356 Archaeology of the Andes (LASP 356)
382 Latin America: An Anthropological Perspective (LASP 382)
456 Mesoamerican Religion, Science, and History (LASP 456)
487 Field Research Abroad—Cornell-Honduras Program (LASP 487)
499 The Amazonian Imagination: Reflections on the Savage State (LASP 499)
565 Maya History (LASP 656)

ARKEO
355 Archaeology of Mexico and Central America (LASP 355)
356 Archaeology of the Andes (LASP 356)

ART H
368 Modern and Contemporary Latin American Art (LASP 368)

AS&RC
451 Politics and Social Change in the Caribbean (LASP 451)
455 Caribbean Literature (LASP 455)
530 Womanist Writing Africa and Caribbean (LASP 530)

COM L
482 Latin American Woman Writers (LASP 482)

CRP
371 Alternatives (LASP 371)
376/676 Latin American Cities (LASP 376/676)
395 Gender and Globalization (LASP 672 and FGSS 672)
616 Globalization and Development (LASP 616)
670 Regional Planning and Development in Developing Nations (LASP 670)
671 Seminar in International Studies and Planning (LASP 671)

ECON
425 Economic History of Latin America (LASP 425)
468 Economic Problems of Latin America (LASP 468)
748 Issues in Latin American Development (LASP 748)
772 Economics of Development (LASP 772)

ENGL
243 Poetry and Politics in the Americas (LASP 243)
418 Racial Democracy in the Americas (LASP 418)
676 Testimonio (Testimonial Narrative) in the Americas (LASP 678)

GOVT
329 The Comparative Politics of Latin America (LASP 329)
340 Latin American Politics (LASP 340)
430 Democracy, Power, and Economic Reform: Cross-Regional Perspectives (LASP 430)
433 Politics of Economic Liberalization in the Developing World (LASP 433)
448 The Quality of Democracy in Latin America (LASP 448)
630 The Political Economy of Market Reform (LASP 630)
631 Comparative Labor Movements in Latin America (LASP 631)
638 Latin American Political Economy (LASP 638)

H ADM
452 Sustainability Issues in the Yucatan and Belize (LASP 452)
455 Ecotourism and Sustainable Development (LASP 457)
496 Latin American Hotel Development Seminar (LASP 496)
498 Sustainability Field Trip in Mexico (LASP 498)

HIST
195 Colonial Latin America (LASP 195)
196 Modern Latin America (LASP 196)
202 Comparative Migration in the Americas (LASP 202)
206 Modern Mexico (LASP 206)
216 Gender and Colonization in Latin America (LASP 216)
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<th>Code</th>
<th>Title</th>
<th>Description</th>
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<td>Mexican Immigration to the U.S.</td>
<td>(LASP 215)</td>
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<td>224</td>
<td>Art and Politics—20th-Century Latin History</td>
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<td>225</td>
<td>The U.S.-Mexico Border: History, Culture, Representation</td>
<td>(LASP 225)</td>
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<td>226</td>
<td>Migration, Cultures and Nation</td>
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<td>Drugs: People, Policies, Politics</td>
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<td>249</td>
<td>Race and Class in Latin American History</td>
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<td>Perspectives on Latin America</td>
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<td>306</td>
<td>Modern Mexico: Independence to Zapastas</td>
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<td>323</td>
<td>Mexico: From Empire to Nation</td>
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<td>Agrarian Societies in Latin American History</td>
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<td>Agrarian History (LASP 416)</td>
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<td>Chronicles of the Conquest of Latin America</td>
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<td>Art and Politics in Twentieth-Century Latin America (LASP 424)</td>
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<td>438</td>
<td>History's Margin: Frontiers and Borders in Comparative Perspective</td>
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<td>449</td>
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<td>459/659</td>
<td>Radicals and Revolutionaries in Modern Latin American (LASP 459/659)</td>
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<td>470</td>
<td>Violence, Nation, Myth: The Americas 1790-1940</td>
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<td>Bandits, Deviants and Rebels</td>
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<td>651</td>
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<td>652</td>
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<td>653</td>
<td>The Political Economy of Mexico</td>
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<td>631</td>
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<td>Labor, Free Trade, and Economic Integration in the Americas</td>
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<td>121-122</td>
<td>Elementary Quechua (LASP 127-128)</td>
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<td>131-132</td>
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<td>Renaissance Hispanism: Spain and the Americas</td>
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LATINO STUDIES PROGRAM

434 Rockefeller Hall

Undergraduate Concentration

The Latino Studies Program offers an interdisciplinary undergraduate concentration in Latino Studies, with courses mostly drawn from history, sociology, anthropology, literature, and language, but the program will also cross-list courses from other colleges.

- To complete the concentration, students must take at least five courses (a minimum of 15 credits) in Latino Studies, including “Latinos in the United States” (D SOC 265, LSP 201, and SOC 265), which is offered each spring semester.

- Students are required to include at least three courses from Groups I and II (one from each group, and another from either group). Of the three courses two must be at the 300 or 400 level.

One elective course (see list below) can count toward the concentration. Courses must be completed with a letter grade of “C” or above. Independent studies and freshman writing seminars do not count toward concentration requirements. The list varies each semester in accordance with faculty schedules and visiting appointments.

Group I: Humanities

LSP 203 Comparative Migration in the Americas (also AM ST 204 and HIST 202)
LSP 225 The U.S.–Mexico Border: History, Culture, Representation (also AM ST 225 and HIST 225)
LSP 240 Survey in U.S. Latina/o Literature (also AM ST 240 and ENGL 240)
LSP 246 Contemporary Narratives by Latina Writers (also FGGS 246 and SPANL 246)
LSP 248 Poetry of the Latina/o Experience (also SPANL 248)
LSP 260 Latinos in the U.S.: Colonial Period to 1898 (also AM ST 259 and HIST 260)
LSP 261 Latinos in the U.S.: 1898 to the Present (also AM ST 261 and HIST 261)
LSP 303 After Immigration (also SPANL 303)
LSP 366 Spanish in the United States (also LING 366 and SPANR 366)
LSP 398 Latina/o Cultural Practices (also AM ST 396 and ENGL 398)
LSP 430.5 The Bahinor Seminar: Exile, Immigrants, and Transnationals: Shaping U.S.–Cuba Relations (also AM ST 430.5 and HIST 448)
LSP 462 Senior Seminar in Latina/o Studies: Chicana Feminism in a Globalizing World (also ENGL 462)
LSP 693 Gender, Globalization, and Latina/o Literature (also ENGL 693)

Group II: Social Sciences

LSP 201 Latinos in the United States (also D SOC 205 and SOC 265)
LSP 220 Sociology of Health of Latinos and Ethnic Minorities (also D SOC 220)
LSP 221 Anthropological Representation: Ethnographies of Latino Culture (also AM ST 221 and ANTHR 221)
LSP 311 Social Movements (also AM ST 311 and SOC 311)
LSP 319 Minority Politics in the United States (also GOVT 319)
LSP 355 Latinos, Law, and Identity (also AM ST 357 and D SOC 355)
LSP 375 Comparative U.S. Racial and Ethnic Relations (also AM ST 375 and D SOC 375)
LSP 377 The United States (also AM ST 377 and ANTHR 377)
LSP 430 Immigrants, Membership, and Citizenship (also AM ST 430.4 and GOVT 427)
LSP 431/631 Farmworkers (also HIST 431 and HIST 631)
LSP 486 Dominican Identity Formations (also AM ST 486 and HIST 486)
LSP 610 Political Identity: Race, Ethnicity, and Nationalism (also GOVT 610)
LSP 624 Ethnoracial Identity in Anthropology, Language, and Law (also ANTHR 624 and LAW 723)
LSP 660 Language, Ideologies and Practices (also ANTHR 660)

Electives:

LSP 100 Introduction to World Music I: Africa and the Americas (also MUSIC 103)
LSP 101 Information Literacy in Latino Studies
LSP 111 Introduction to American Studies: New Approaches to Understanding American Diversity, The Twentieth Century (also AM ST 110 and HIST 111)
LSP 202 Spanish for English/Spanish Bilinguals (also SPANR 200)
LSP 241 Immigration and Ethnicity in Twentieth-Century U.S. (also HIST 240)
LSP 368 Modern and Contemporary Latin American Art (also ART H 368)
LSP 386 Third Cinema (also FILM 386)
ART 214 Art and the Multicultural Experience

Other elective courses will be determined each semester.

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 (400/600) tentatively titled Introduction to Latino Studies: History and Methodologies, and work intensively with a faculty member outside of their major field. Over the course of their study they will be expected to take two other Latino Studies graduate or advanced undergraduate courses outside of their major field. In lieu of available courses, the student and his or her minor field adviser may design a special project that culminates in a paper given at a conference or presented for publication. Each special project requires the approval of the director of graduate studies for the minor field. In addition, graduate students will participate in the annual Latino Studies Colloquium. Upon completion of the minor, students receive a certificate from the program. 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 an extensive collection of books, periodicals, and films. The library and conference room also provide meeting space for more than 20 Latino student organizations.

Courses

LSP 590 Introduction to World Music: Africa and the Americas (also MUSIC 103)

Spring. 3 credits. 1 hour discussion. S. Pond.
Exploration of folk, popular, and traditional genres of the Western Hemisphere, particularly the African diaspora. The course examines both the elements of musical styles and the features of society that influence music. Listening assignments are major components of the course.
Among the immigrant-receiving nations the reasons for population movements; restrictionist responses; and women and immigration policies; social, economic, and political accommodation; nativist and restrictive immigration policies; and the World Wide Web. Instructors will provide equal time for lecture and hands-on learning. Topics will include government documents, statistics, subject-specific online databases, social sciences, the humanities, and electronic citation management.

**LSP 111 Introduction to American Studies: New Approaches to Understanding American Diversity: The Twentieth Century (also AM ST 110 and HIST 111)**

Fall. 4 credits. M. C. García.

This course examines American national life in the twentieth century and asks questions about the changing meaning of national identity. What does it mean to be an American in the twenty-first century? What does it mean to assimilate? Can on assimilate structurally and yet maintain a distinct cultural identity? In what ways do racial and ethnic perceptions structure political, economic, and cultural life? This is a team-taught interdisciplinary course in which students analyze historical, literary, and cultural evidence in exploring these and other issues.

**LSP 201 Latinos in the United States (also SOC 265 and D SOC 265)**

Spring. 4 credits variable. H. Velez.

Exploration and analysis of the Hispanic experience in the United States. An examination of sociohistorical background and economic, psychological, and political factors that converge to shape a Latino group identity in the United States. Perspectives are suggested 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.

**LSP 202 Spanish for English/Spanish Bilinguals (also SPANR 200)**

Fall and spring. 3 credits. Staff.

A course designed to expand bilingual student's knowledge of Spanish providing them with ample opportunities to develop and improve each of the basic language skills.

**LSP 203 Comparative Migration to the Americas (also HIST 202 and AM ST 204)**


This seminar examines migration both within and to the Americas in the nineteenth and twentieth centuries. Topics discussed include the reasons for population movements; immigration policies; social, economic, and political accommodation; nativist and restrictive immigration policies; and gender and women and migration, remittances, and transnationalism. Among the immigrant-receiving nations studied are Argentina, Brazil, Canada, Cuba, Mexico, and the United States.

**LSP 220 Sociology of Health and Ethnic Minorities (also D SOC 220)**

Fall. 3 credits. M. C. García.

Discusses the health status of minorities in the United States. Specifically, we explore 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 221 Anthropological Representation: Ethnographies on Latino Culture (also AM ST 221 and ANTHR 221)**

Fall. 3 credits. V. Santiago-Irizarry.

Representation is basic to anthropology. In translating cultures, anthropologists produce authoritative representations of and about other people's lives. In this course, we examine with a critical eye, the production of representations about U.S. Latino cultures, as they are embodied in anthropological texts. Issues explored include the relation between the ethnographer and the people he or she is studying; the compatibility of ethnographic texts are produced, and the way they may position different cultural groups within the larger national context.

**LSP 225 The U.S.-Mexico Border: History, Culture, Representation (also HIST 225 and AM ST 225)**


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 discuss the disciplinary and methodological borders of academia 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. Readings will chart and critique developments beginning with the Civil Rights struggles during the 1960s among Chicana/os in the western and southwestern United States and among Nuyorican writers on the East Coast; to the 1980s development of feminist, lesbian, and gay poetry; to the Cuban poets of the "new" migration from Latin America; to the "new" migration from Latin America; and to the Americas in the nineteenth and twentieth centuries. Topics discussed include the reasons for population movements; immigration policies; social, economic, and political accommodation; nativist and restrictive immigration policies; and women and migration, remittances, and transnationalism. Among the immigrant-receiving nations studied are Argentina, Brazil, Canada, Cuba, Mexico, and the United States.

**LSP 246 Contemporary Narratives by Latina Writers (also SPANL 246 and FGSS 246)**

Fall. 3 credits. L. Carrillo.

This course offers a survey of narratives by representative Latina writers of various Latino ethnic groups in the United States including Chicana, Chican, Cuban, Dominican, and Puerto Rican. We investigate the parallel development of a Latino perspective on personal, social and cultural issues alongside that of the U.S. ethnic liberation/revitalization movements of the 1960s through contemporary feminist activism and women of color movements. We integrate these works as artistic attempts to deal with such issues as culture, language and bilingualism, family, gender, sexuality, and domesticity. We account for regional distinctions and contributions. Readings include works by Julia Alvarez, Gloria Anzaldúa, Elena Casleo, Ana Castillo, Denise Chávez, Sandra Cisneros, Judith Ortiz Cofer, Cristina Garcia, Nora Glickman, Nicholas Mohr, Cherrie Moraga, Archy Ojbejas, Esmeralda Santiago, Ana Lydia Vega, and Helen Maria Viramontes.

**LSP 248 Poetry of the Latina/o Experience (also SPANL 248)**

Spring. 3 credits. L. Carrillo.

A survey of the central importance of poetry in the modern and contemporary Latina/o experience. Readings will chart and critique developments beginning with the Civil Rights struggles during the 1960s among Chicana/os in the western and southwestern United States and among Nuyorican writers on the East Coast; to the 1980s development of feminist, lesbian, and gay poetry; to the Cuban poets of the "new" migration from Latin America; to the "new" migration from Latin America; and among Nuyorican writers on the East Coast; to the 1980s development of feminist, lesbian, and gay poetry; to the Cuban poets of the "new" migration from Latin America; and among Nuyorican writers on the East Coast; to the 1980s development of feminist, lesbian, and gay poetry; to the Cuban poets of the "new" migration from Latin America; and the transnational influence of immigrant communities on their homelands.
Jardin de Eden—
The course studies films like on the immigrant experience: that of the New York, chosen to remain in their countries of origin. Students are encouraged to do individually tailored research projects that may include autobiographical or ethnographic elements as well as literary analysis and theoretical inquiries.

**LSP 311 Social Movements (also D SOC and AIS 311)**
Spring. 3 credits. A. González.
Social movements are collective efforts by relatively powerless groups of people to change society. Typically conceptualized as non- (or extra-) institutional political activity, social movements are "politics by other means." In this course we will examine the transnational dimensions of social movements to assess the implications of globalization for political mobilization and the ways that social movement actors engage global political process to effect social change. Under what circumstances do movements emerge? How do global processes shape both domestic and transnational political mobilization? How do movements internally organize and choose goals? How have social movements changed history, identities, society and politics? This course addresses these and related questions through an examination of indigenous peoples movements in the United States, Canada, and Latin America.

**LSP 319 Racial and Ethnic Politics in the United States (also GOVT 319 and AM ST 313)**
Spring. 4 credits. M. Jones-Correa.
In 1965 the landscape of American politics changed dramatically with the passage of the Voting Rights Act. That same year, Congress passed the Immigration Reform Act, which, though little heralded at the time, arguably has had equally profound effects. This course provides a general survey of minority politics in the United States, focusing on the effects of these two key pieces of legislation. The course highlights the relationships between immigrants and minorities, electoral politics and protest politics, and the interaction between cooperation and competition within and among minority groups. The purpose of the course is not only to pinpoint the similarities and differences in the agendas and strategies adopted by minority groups, but to indicate the interaction between "minority" politics and American politics as a whole.

**LSP 355 Latinos, Law, and Identity (also AM ST 357 and D SOC 355)**
Spring. 3 credits. R. Mize.
A critical exploration of the critical legal-justice movement and its relationship to Latina/o identities. Though the course will emphasize specific legal issues, federal and state laws, and constitutional issues that impact Latina/os residing in the United States, the sociological implications of the relationship between law and society will be highlighted. The first successful school-desegregation cases were a result of Mexican American parents challenging separate schools in cases such as the 1939 Alvarez v. Lemon Grove School District of California and the 1947 Mendez v. Westminster, California decisions. Specific topics will include jurisprudence over Puerto Rican commonwealth and citizenship status, Cuban refugee status and foreign-policy decisions, the sanctuary movement on behalf of Central Americans. Students will receive a thorough introduction to specific theoretical contributions of law and society, critical race theory, Legal, and outsider jurisprudence perspectives that will be applied to historical precedent as well as current attempts at marginalizing/empowering Latina/o communities. The relationship between the legal sphere and social movements will be discussed, as well as how laws work to both impose and shape Latina/o identities, while they provide spaces for identity formation from within and Pan-Latina/o coalitions. Specific current examples will look at immigration challenges to colonialism, legal support for cross-border unionization, and redress for historical wrongs such as the U.S.—Mexico Bracero Program (1942—1964).

**LSP 366 Spanish in the United States (also LING 366 and SPANR 366)**
This course provides an examination of major Spanish dialects in the United States from a linguistic perspective. Contrast is made to the standard language. Topics include borrowing, interference, and code switching. Special emphasis is on syntactic, morphological, and phonological characteristics.

**LSP 368 Modern and Contemporary Latino/Latin American Art (also ART H 368)**
This course is designed as a thematic survey of Latin American Latino art from the early twentieth century to the present. Attention is given to issues such as the effect of colonialism on the creation of Latin American visual arts, the creation of national artistic styles, the relation of Latin American arts and artists to European and American cultural 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 Latino women to various aspects of artistic practice.

**LSP 375 Comparative U.S. Racial and Ethnic Relations (also AM ST 375 and D SOC 375)**
Fall. 3 credits. R. Mize.
This course introduces and evaluates theories of race and ethnicity through a comparative-historical study of the social construction of race. Within the context of the formation of the United States, the course will examine structures of racism as they influence Latina/o, African American, Native American, and Asian American experiences. The purpose is to examine the social construction of race through the attendant institutions of racism such as slavery, Jim Crow, land loss and violence, genocide, war, ideology (from Manifest Destiny to free labor), second-class citizenship, immigration restriction, colonialism, internment, and temporary worker programs. Differences and commonalities among the historically racialized groups will be the main source for comparative analysis. In addition, the course will include a survey of the sociological theories of race and ethnicity as well as a critical interrogation of whiteness and ethnic identities. The course will map the origins of ‘race’ thinking in the era of scientific racism (biological determinism, Social Darwinism, and eugenics), and critically interrogate their link to sociological theories of race as culture, ethnicity, nation, and class. Contemporary theories of race and racism are highlighted, especially the U.S. racialization of Latina/os and African Americans. The heterogeneity of Latina/o lived experiences in the United States will be compared/contrasted with Afro-Caribbean and African immigrant lived experiences within the category of ‘being Black in America.’ The course will focus on the 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.

**LSP 377 The United States (also ANTHR 377 and AM ST 377)**
The anthropological inquiry into one’s culture is never a neutral exercise. This course explores issues in the cultural construction of the United States as a “pluraisitic” society. We look at the ideological context for the production of a cultural profile predicated 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 include historic documents and accounts, popular writings, and recent ethnographies on the United States.

**LSP 386 Cinema and Social Change (also FILM 386)**
Spring. 4 credits. Prerequisite: previous course in film history or analysis helpful, though not mandatory. A. Villanueva.
This course explores postcolonial film and video through the rubric of “third cinema.” We investigate the diverse historical, national, political, and generic commitments of films from Africa, South Asia, U.S. Latino, Latin America, and the United Kingdom. Readings in film and postcolonial theory guide our critical analyses of the film.

**LSP 398 Latino/a Cultural Practices (also ENGL 398 and AM ST 398)**

**LSP 406 The Immigrant City: 1900—2000 (also S HUM 406, AM ST 406, HIST 412)**

**LSP 420/421 Undergraduate Independent Study**
Fall and spring. 2—4 credits. Permission of instructor.
Guided independent study.
LAW AND SOCIETY

Co-Directors: M. Lynch (science and technology studies), 302 Rockefeller Hall, 255-7294, me17@cornell.edu; and R. Lieberwitz (ILR), 287A Ives Hall, 255-3289, dl5@cornell.edu.

Advisers: G. Alexander (law), D. Dunning (psychology), G. Hay (law), B. Hendrix (government), P. Hyams (history), M. Katzenstein (government), R. Miller (philosophy), M. Moody-Adams (philosophy), M. B. Norton (history), R. Polenberg (history), D. Powers (Near East studies), J. Rabkin (government), A. Riles (law), V. Santiago-Irizarry (anthropology), P. Sawyer (English), S. Shuffrin (law).

The Law and Society concentration provides an opportunity for focused study of the interaction between law and society from an interdisciplinary perspective. The major is rooted in the social sciences and humanities: anthropology, comparative literature, economics, government, history, philosophy, psychology, science and technology studies, and sociology.

The concentration is open to all undergraduates, but interested students with majors outside the College of Arts and Sciences are advised to check their college's policies and procedures regarding external concentrations, including whether the concentration will be included on their college transcript. All students completing the concentration will receive a certificate and can include their participation in the Law and Society concentration on a resume or law school application.

To allow sufficient time for a coherent program of study to be developed and completed, students who have an interest in this concentration 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 concentration's requirements. Special late registration forms that include the student’s plan outline are available in the Ethics and Public Life (EPL) office, 240 Goldwin Smith Hall.

The standard Law and Society registration form is available online at www.arts.cornell.edu and in the EPL office. 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 concentration. The name and contact information of the assigned advisor is 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 and participation in Law and Society events a particularly beneficial component of the concentration. 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. Attendance at a minimum of four events (tracked with sign-in sheets) is required during the time period between...
registration and graduation, but students seeking a broader perspective are encouraged to attend as many events as they can.

**Four-Course Requirement**

Law and Society is an interdisciplinary concentration 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. Of the four qualifying courses, at least two must be outside the student's major, and no more than two can be in the same subject area. (NOTE: students who have a double major are permitted to select one major as the dominant and use applicable courses from the second major toward the four-course requirement.) Appropriate courses taken before registering for the Law and Society concentration can be counted toward the four-course requirement. There are no required courses, but past students have found GOVT 313 and PSYCH 265 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 one of the directors for their determination. Petitions for course substitutions should be submitted prior to the student's final semester.

To facilitate tracking of courses taken and/or events attended, a printable Student Progress Record can be accessed electronically or obtained as a preprinted form from the EPL office. The Law and Society concentration 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, or 607-255-8515.

**Approved Law and Society Courses**

**Arts and Sciences**

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<td>Civil Liberties in the United States</td>
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<td>Structure of American Political History</td>
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<td>Varieties of American Dissent, 1880-1990</td>
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<td>AM ST 395/ENGL 397</td>
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<td>Conflict, Dispute Resolution, and Law in Cultural Context</td>
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<td>Ethnoracial Identity in Anthropology, Language, and Law</td>
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<td>ASIAN 476/HIST 476</td>
<td>Comparative Colonial Law and Society</td>
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<tr>
<td>AS&amp;RC 204</td>
<td>History and Politics of Racialization: A Comparative Study</td>
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SOC 326 Social Policy
SOC 340 Health, Behavior, and Health Policy
SOC 352 The Sociology of Contemporary Culture
SOC 356 Law and Society
SOC 357 Schooling and Society
SOC 375/D/SOC 301 Theories of Society

College of Art, Architecture, and Planning
CRP 293/GOVT 293/PHIL 193/SOC 293 Inequality, Diversity, and Justice
CRP 390 Environmental Politics
CRP 444/444/NTRES 444 Resource Management and Environmental Law
CRP 451 Environmental Law
CRP 474 Third World Urbanization

College of Human Ecology
HD 456 Families and Social Policy
HD 233 Children and the Law
PAM 204 Applied Public Finance
PAM 230 Introduction to Policy Analysis
PAM 280/AS&RC 280 Race, Power, and Privilege in the United States
PAM 310 Evaluation of Public Policies
PAM 334 Corporations, Shareholders, and Policy
PAM 341 Economics of Consumer Law and Protection
PAM 383 Social Welfare as a Social Institution
PAM 473 Social Policy
PAM 552 Health Care Services: Consumer and Ethical Perspectives

College of Agriculture and Life Sciences
AIS 311/D/SOC 311 Social Movements
AIS 367/D/SOC 367 American Indian Politics and Policy
D SOC 200/SOC 200 Social Problems
D SOC 206/FGSS 206 Gender and Society
D SOC 207/SOC 207 Problems of Contemporary Society
D SOC 301/SOC 375 Theories of Society
D SOC 311/AIS 311 Social Movements
D SOC 367/AIS 367 American Indian Politics and Policy
EDUC 471 Social and Political Context for American Education
EDUC 477 Law and Education Policy
NTRES 212 People, Values, and Natural Resources
NTRES 306 Coastal and Oceanic Law and Policy
NTRES 407 Religion, Ethics, and the Environment
NTRES 444/CRP 444/444 Resources Management and Environmental Law

School of Industrial and Labor Relations
ILRCB 201 Labor and Employment Law
ILRCB 401 My Brother's Keeper: Volunteerism, Philanthropy
ILRCB 488 Liberty and Justice for All
ILRCB 604 Theories of Equality and Their Application in the Workplace
ILRCB 607 Values in Law, Economics, and Industrial Relations
ILRCB 608 Special Topics: Sex Discrimination and the Law
ILRCB 609 Special Topics: Labor Law and Policy Seminar
ILRCB 681 International Labor Law
ILRCB 684 Employment Discrimination and the Law
ILRCB 689 Constitutional Aspects of Labor Law

LESBIAN, BISEXUAL, AND GAY STUDIES

The field of Lesbian, Bisexual, and Gay Studies is devoted to the interdisciplinary study of the social construction of sexuality. LBG 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 LBG Studies offers an undergraduate concentration, which is administered under the auspices of Feminist, Gender, and Sexuality Studies and which consists of four courses from the list below. Although most of the courses in LBG 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 LBG Studies concentration. In order to qualify for the concentration, courses must devote a significant portion of their time to sexuality and to questioning the cultural and historical institution of exclusive heterosexuality.
Students selecting their four courses from the LBG Studies subset must identify their concentration as either LBG Studies or Students selecting their four courses from both concentrations.

Students interested in the LBG Studies concentration should contact the Lesbian, Bisexual, and Gay Studies Office at 386 Uris Hall.

Courses

ANTHR 200 Cultural Diversity and Contemporary Issues
Fall. 3 credits. A. Willford.
For description, see ANTH 200.

ANTHR 321/621 Sex and Gender in Cross-Cultural Perspective (also FGSS 321/631)
Fall. 4 credits. K. March.
For description, see ANTHR 321.

ENGL 276 Desire (also FGSS 276 and COM L 276)
Spring. 4 credits. E. Hanson.
For description, see ENGL 276.

[ENGL 278 Queer Fiction (also FGSS 279)
Not offered 2004–2005. E. Hanson.]

[ENGL 327 Shakespeare: Gender and Society (also FGSS 327)

ENGL 355 Decadence (also FGSS 355)
Fall. 4 credits. E. Hanson.
For description, see ENGL 355.

[ENGL 395 Video: Art, Theory, Politics (also THETR 395)

[ENGL 424 Studies in Renaissance Lyric

ENGL 478 Intersections in Lesbian Fiction (also FGSS 477, AM ST 478)
Spring. 4 credits. K. McCullough.
For description, see ENGL 478.

[ENGL 608 Seminar in Cultural Studies: Race, Drugs and Gender

[ENGL 651 The Sexual Child (also FGSS 651)
Not offered 2004–2005. E. Hanson.]

[ENGL 654 Queer Theory (also FGSS 654 and COM L 654)
Not offered 2004–2005. E. Hanson.]

ENGL 655 Aestheticism (also FGSS 655 and COM L 655)
Fall. 4 credits. E. Hanson.
For description, see ENGL 655.

[ENGL 660 Cinematic Desire (also AM ST 662 and FGSS 661)

[ENGL 703 Theorizing Film: Race, Nation, and Psychoanalysis (also FRLIT 695)

FGSS 201 Introduction to Feminist, Gender, & Sexuality Studies
Fall. 4 credits. K. McCullough.
For description, see FGSS 201.

FGSS 400 Senior Seminar in Feminist, Gender, and Sexuality Studies
Fall. 4 credits. A. Villarejo.
For description, see FGSS 400.

FGSS 40/605 Domestic Television

FGSS 610 Sexuality and the Politics of Representation (also THETR 610)
Spring. 4 credits. A. Villarejo.
For description, see FGSS 610.

FRLIT 442/642 Sex in French (also FGSS 432/632)
Spring. 4 credits. C. Howic.
For description, see FRLIT 442.

[FRLIT 493 French Feminisms (also FGSS 493)

[GERST 413 The Women around Freud

[GERST 614 Gender at the Fin-de-siècle

[GOVT 467 Radical Democratic Feminisms (also FGSS 468)

[GOVT 762 Sexuality and the Law (also FGSS 762)

HD 284 Gender and Sexual Minorities (also FGSS 285)
Fall. 3 credits. K. Cohen.
For description, see HD 284.

[HD 464 Sexual Minorities and Human Development (also FGSS 467)

[HIST 209 Seminar in Early America (also FGSS 209)

[HIST 273 Women in American Society, Past and Present (also FGSS 273)

HIST 368 Marriage and Sexuality in Medieval Europe (also FGSS 368 and RELST 368)
Fall. 4 credits. P. Hyams.
For description, see HIST 368.

[HIST 416 Gender and Sex in Southeast Asia (also FGSS 416)

[HIST 626 American Women's History (also FGSS 626)

[LING 244 Language and Gender (also FGSS 244)

[MUSIC 492 Music and Queer Identity (also FGSS 494)

[PSYCH 450/650 Gender and Clinical Psychology (also FGSS 450/650)

[SPAN L 384 Literature and Revolution

[SPAN L 400 Mariculture as Queer Theory

LINGUISTICS

http://ling.cornell.edu

J. Bowers, chair (214 Morrill Hall); D. Zec, director of graduate studies (219 Morrill Hall); W. Harbert, director of undergraduate studies, fall (210 Morrill Hall); M. Weiss, director of undergraduate studies, spring (213 Morrill Hall); D. Abusch; W. Brown; A. Colman; C. Collins, M. Diesing, S. Hertz, S. McConnell-Ginet, A. Miller-Ockhuizen, A. Nussbaum, M. Rooth, C. Rosen, J. Whitman.

Visiting: R. Hastings, M. Przyczudziecki.

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 linguistics 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 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 101, 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 101 and other introductory courses fulfill the social science distribution requirement. Most 100- and 200-level courses have no prerequisites and cover various topics in linguistics (e.g., LING 170, Introduction to Cognitive Science; LING 285, Linguistic Theory and Poetic Structure) or focus on the linguistics of a particular geographic region or historical development of particular languages (e.g., LING 217, History of the English Language to 1300; LING 299, The Celtic Languages). 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, in the fall, contact Professor Wayne Harbert
(210 Morrill Hall, 255-8491, wzh2@cornell.edu); for spring, see Professor Michael Weiss
(213 Morrill Hall, 255-3073, mlw36@cornell.edu).

The prerequisite for a major in linguistics is the completion of LING 101 and either LING
301, 302, 303, or 304. The major has its own language requirement, different from that
of the College of Arts and Sciences, which should be completed as early as possible:
majors must complete the equivalent of two semesters of college-level study of a language
that is either non-European or non-Indo-European (language study undertaken to
satisfy the college requirement can also count toward the major requirement if the language
meets these conditions). With approval of the department's director of undergraduate
studies, this requirement may be waived for students taking the cognitive studies
concentration or a double major.

The other standard requirements for the linguistics major are as follows:
1) LING 301 (Introduction to Phonetics), LING 302 (Introduction to Phonology),
LING 303 (Introduction to Syntax), and LING 304 (Introduction to Semantics and
Pragmatics) [one of which will already have been taken as a prerequisite to the
major].
2) LING 314 (Historical Linguistics)
3) Two additional courses in general
linguistics (as opposed to courses devoted to a single language or family) at the 300 or
400 level.
4) A course at or beyond the 300 level in the structure of a language, or LING
400 (Language Typology) or 600 (Field Methods).

Some substitutions to these standard
requirements are possible after consultation
with your adviser and approval by the DUS.

Honors
Applications for honors should be made
during the junior year or by the start of
fall term 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 3.2
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 examination in
defense of it. The thesis is usually written
during the senior year but may be started
in the second term of the junior year when
the student's program so warrants. The oral
examination will be conducted by the honors
committee, consisting of the thesis adviser
and at least one other faculty member in
linguistics. Members of other departments
may serve as members if the topic makes this advisable. LING 493 and 494 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 101 Introduction to Linguistics (III) (KCM)
Fall or spring. 4 credits each term. Fall, C. Rosen; spring, M. Diesing.
An overview of the science of language, especially its theoretical underpinnings,
methods, and major findings. Among the areas covered are: 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 109 English Words: Histories and
Mysteries (also CLASS 171) # (III) (H)
Spring. 3 credits. M. Weiss.
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 etymological
formal and semantic change; taboo and
euphemism, borrowing, new words from old,
“learned” English loans from Greek and Latin,
slang, and society.

LING 111 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 112 American Sign Language II
Summer only. 4 credits. Prerequisites:
LING 111 or permission of instructor.
T. Galloway.
In this intermediate course, students continue
develop expressive and receptive fluency in
ASL. Focus is on greater descriptive skill,
developing intermediate-level narratives, and
enhancing conversational ability. Advanced
grammar and vocabulary is supplemented
with further instruction in the linguistic
structure of ASL. Readings, class discussions,
and videotexts containing samples of the
visual literature of the U.S. Deaf community
continues students' investigation into American
Deaf history and the shaping of modern Deaf
culture.

LING 131-132 Elementary Sanskrit (also
CLASS 191-192 and SANSK 131-132)
For description, see SANSK 131-132.

LING 170 Introduction to Cognitive
Science (also COGST 101, COM S
101, PHIL 191, and PSYCH 102) (III)
(KCM)
For description, see COGST 101.

LING 212 Sophomore Seminar: Language
and Culture (III) (KCM)
Spring. 4 credits. J. Whitman.
We often assume that there is a close
relationship between differences in language
and cultural variation. The issues in this
seminar draw on linguistics, anthropology,
philosophy, and psychology, and focuses
on that relationship, beginning with an
examination of the linguistic relativity
hypothesis, which posits a link between basic
properties of languages and cross-cultural
differences in worldview. We also examine
potential cultural determinants of variation in
language: pronouns and honorific systems,
systems of ritual and taboo in language,
and the impact of narrative organization
on grammar. Special attention is paid to
"extreme" forms of language: invented
languages from Esperanto to Klingon,
glossolalia and trance languages, language
games and secret languages. There will be
weekly writing assignments, building in length
and range of independence, including a final
paper based on a research project chosen
by the students.

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 to initiating students into the
discipline's outlook, discourse community,
modes of knowledge, and ways of articulating
that knowledge. Enrollment is limited to 15.
Special emphasis is given to strong thinking
and writing and to personalized instruction
with top university professors.

LING 215/216 Psychology of Language
(Also PSYCH 215 and COGST 215) (III) (KCM)
For description, see PSYCH 215

[LING 217 History of the English
Language to 1300 (also ENGL 217) #
(III or IV) (HA)]
W. Harbert.
This course explores the development of the
English language from its Indo-European
beginnings through the period of Early Middle
English. Topics covered include linguistic
reconstruction, sound, vocabulary and
grammatical structure, external influences,
and Old and Early Middle English language
and literature. This course forms a sequence
with LING 218, but the two may be taken
independently.

[LING 218 History of the English
Language since 1300 (also ENGL
218) (III or IV) (HA)]
W. Harbert.
This course explores the development of the
English language from the time of Chaucer
to the present. Topics covered include
the development of standard English; the
rise of English as a world language; the
rise of modern concepts of grammar; the
development of dictionaries; American
and British English; regional and social variation
in American English, English, and culture;
and English and politics. Guest lecturers will be
invited to discuss Middle and Modern English
This course is an introduction to the Scottish literature. This course forms a sequence with LING 237, but it may be taken independently.

LING 237 The Germanic Languages (also GERST 237) (III) (KCM)
This course surveys the history, structure, and use of the modern Germanic languages (English, German, Dutch, Afrikaans, Swedish, Danish, Icelandic, Norwegian, Faroese, and Yiddish.)

LING 238 Introduction to Welsh
Fall. 3 credits. W. Harbert.
This course is an introduction to the Welsh language, with discussion of its history, structure, and current status, and a brief introduction to Welsh literature.

LING 239/539 The Celtic Languages (III) (CA)
This course surveys the history, structure, and political and social situation of the Celtic languages (Welsh, Scottish Gaelic, Irish Gaelic, Breton, Cornish, and Manx). The course includes a few days of introductory language instruction in some of these languages.

LING 241 Yiddish Linguistics (also JWST 271) (III) (SBA)
This course is a basic introduction to the regional dialects of English spoken in the United States. It is linguistically oriented, introducing the relevant aspects of phonetics, phonology, morphology, and syntax where appropriate. There is an emphasis on the students discovering what features characterize their own dialects (if they speak American English). The class is also of use as an introduction to American English dialects for nonnative speakers of English.

LING 242 Diversity in American English (III) (SBA)
This course is a basic introduction to the regional dialects of English spoken in the United States. It is linguistically oriented, introducing the relevant aspects of phonetics, phonology, morphology, and syntax where appropriate. There is an emphasis on the students discovering what features characterize their own dialects (if they speak American English). The class is also of use as an introduction to American English dialects for nonnative speakers of English.

LING 244 Language and Gender (also WRLS 244)
This course explores connections between language 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 246/546 Minority Languages and Linguistics (III) (SBA)
This course examines minority languages from a linguistic, social, and political perspective. Topics discussed include language death (according to some projections, the majority of the world’s languages are in danger of becoming extinct by the end of this century), language maintenance efforts and the reasons they succeed or fail, bilingualism, language contact, official languages, linguistic rights, and related issues. A range of specific case studies are introduced, and each student is expected to research and report on aspects of the history, current situation, and future prospects of a minority language of his or her choosing.

LING 251-252 Intermediate Sanskrit (also CLAS 585 and SANSK 251-252) @ # (IV)
Satisfies language proficiency and Option 1.
For description, see SANSK 251–252.

LING 264 Language, Mind, and Brain (also COGST 264) (III) (KCM)
Spring. 4 credits. For nonmajors or majors. Prerequisite: a basic course in linguistics and/or psychology is desirable. Not offered 2004–2005. J. Bowers.
An introductory course that emphasizes the formal structure of natural language and its biological basis. The following topics are covered: the formal representation of linguistic knowledge, principles and parameters of universal grammar, the basic biology of language, mechanisms of linguistic performance, the modularity hypothesis, and language and cognition. This course is especially suited for majors in fields such as psychology, philosophy, computer science, and linguistics (and also for those enrolled in the concentration in linguistics who want to take a one-semester introduction to linguistics that concentrates on the formal principles that govern linguistic knowledge, along with some discussion of their biological realization and their use in perception and production.)

LING 270 Truth and Interpretation (also COGST 270 and PHIL 270) (III or IV)
Not offered 2004–2005. For description, see PHIL 270.

LING 285/585 Linguistic Theory and Poetic Structure (also ENGL 295/585) (III or IV) (LA)
Poems are among the most highly structured linguistic objects that human beings produce. While some of the rules in poets are arbitrary and purely conventional, most are natural extensions of structural properties inherent in natural language itself. The aim of this course is to reveal the ways poetry is structured at every level, from rhyme to metaphor, and to show how certain results of modern linguistics can usefully be applied to the analysis and interpretation of poetry. After introducing some of the basic concepts of modern phonology, syntax, and semantics, it is shown how literary notions such as rhyme, meter, enjambment, and metaphor can be formally defined in linguistic terms. These results are then applied to the analysis of particular poems and shown to yield novel and interesting insights into both their structure and interpretation.

LING 301 Introduction to Phonetics (III) (KCM)
Fall. 4 credits. Prerequisite: LING 101 or permission of instructor. M. Przezdziecki.
An introduction to the study of the physical properties of human sound, including production, acoustics, and perception of speech. The course provides in-depth exposure to the breadth of sounds found across human languages. Students will achieve a high level of skill in phonetic transcription and some practice in reading spectrograms. An introduction to speech synthesis and automatic speech recognition is also provided. A small course project to discover the phonemes of an unknown language is undertaken.

LING 302 Introduction to Phonology (III) (KCM)
Spring. 4 credits. Prerequisite: LING 101 or permission of instructor. D. Zec.
This course is an 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 303 Introduction to Syntax (III) (KCM)
Fall. 4 credits. Prerequisite: LING 101 or permission of instructor. R. Hastings.
An 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. The topics covered 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 304 Introduction to Semantics and Pragmatics (III) (KCM)
Spring. 4 credits. Prerequisite: LING 303 or permission of instructor. R. Hastings.
This course examines the two major components of sentence meaning: (i) how sentences mean what they mean and (ii) how they can be used to communicate more than what they (literally) mean. We investigate precise ways of describing the possible interpretations of a sentence and the relationship between meaning and syntactic structure. Among the topics considered are the representation of lexical meaning, the meaning of quantifier phrases and analyses of scope ambiguities, and classic puzzles of reference. We also examine possible applications of the theory to linguistically interesting legal concepts (e.g., double negation, disjunctive law), slips of the tongue, acquisition studies, language disorders, and connections with the philosophy of language.
ARTS AND SCIENCES - 2004-2005

[LING 305 Foundations of Linguistics (also COGST 305) (III) (KCM)]
Fall. 4 credits. Prerequisites: LING 101 plus one other LING course, or two similar courses in another area of cognitive studies. Not offered 2004-2005. C. Collins. This course covers foundational issues in linguistic theory, including the nature of linguistic data, poverty of stimulus, autonomy of syntax, different frameworks (including functional linguistics), and the history of linguistics.

[LING 308 Readings in Celtic Languages]
Fall or spring, depending on demand. 2 credits. S-U grade only. Prerequisite: permission of instructor. W. Harbert. Reading/discussion groups in Welsh or Scottish Gaelic.

[LING 311 The Structure of English: Demystifying English Grammar (also ENGL 313) (II) or IV) (KCM)]
Spring. 4 credits. Not offered 2004-2005. Staff. Do you suffer from grammatical insecurity? In foreign language classrooms, do you find yourself at a loss because you don't know how grammatical terminology applies to English? This course makes English grammar accessible and comprehensible to native speakers who want to understand how the language they use so easily works. In addition to standard grammatical notions, the course considers dialectal variation, matters of style, how sentence structure conveys viewpoint, and other discourse phenomena.

[LING 314 Introduction to Historical Linguistics # (II) (HA)]
Fall. 4 credits. Prerequisite: LING 301 or permission of instructor. M. Weiss. A survey of the basic mechanisms of linguistic change, with examples from a variety of languages.

[LING 315-316 Old Norse]
315: fall; 316, spring. 4 credits each term. E. Johansson. Old Norse is a distinctive 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. 315: The structure of Old Norse (Old Icelandic), phonology, and morphology, with reading of selections from the Prose-Edda, a thirteenth-century narrative based on the Eddaic poetry. 316: Extensive reading of Old Norse texts, among them two sections from some of the major Icelandic family sagas: Náls saga, Grettis saga, and Egils saga, as well as the whole Hrafnkels saga.

[LING 321-322 History of the Romance Languages (also ROM S 321) (III) (KCM)]
321: fall; 322, spring. 4 credits each term. Prerequisites: LING 101 or equivalent and qualification in any Romance language. Offered alternate years. 322 not offered 2005. C. Rosen. Course covers popular Latin; Pan-Romance trends in phonology, morphology, syntax, and the lexicon; regional divergence; non-Latin influences; and medieval diglossia and emergence of Romance standards. 322:
French, Italian, and Spanish from 850 to 1250 A.D. Analysis of texts. Overview of other languages to the present day. Elements of dialectology.

[LING 323 Comparative Romance Syntax (also ROM S 323) (III) (KCM)]
Spring. 4 credits. Prerequisites: LING 101 or equivalent and qualification in any Romance language. Offered alternate years. Not offered 2004-2005. C. Rosen. Concise survey of romance syntax, covering the salient constructions in six languages with equal attention to their historical evolution and their current state. Grammatical innovation and divergence in a typological perspective.

[LING 332 Philosophy of Language (also PHIL 332) (IV)]
For description, see PHIL 332.

[LING 333 Problems in Semantics (also PHIL 333 and COGST 333) (III or IV) (KCM)]
Spring. 4 credits. Prerequisite: logic or semantics course or permission of instructor. Not offered 2004-2005. M. Rooth. This course looks at problems in the semantic analysis of natural languages, critically examining work in linguistics and philosophy on particular topics of current interest. The focus for 2004 was word meaning (lexical semantics). Topics include lexical decomposition (the hypothesis that at the semantic level words are typically syntactically complex), Fodor’s arguments for conceptual atomism, natural kinds and the contextual determination of meaning, theta roles, event semantics, Jackendoff’s conceptual semantics, the linguistic architecture linking lexical semantics to syntax and morphology, and comprehensive lexical-semantic classifications such as Levin classes and Wordnet.

[LING 347 Topics in the History of English (III) (HA)]
Spring. 4 credits. Prerequisite: LING 217, 314, a course in Old or Middle English, or permission of instructor. Not offered 2004-2005; next offered 2005-2006. W. Harbert. The course will treat specific topics in the linguistic history of the English language, selected on the basis of particular interests of the students and the instructor.

[LING 366 Spanish in the United States (also SPANR 366 and LSP 366) (III) (CA)]

[LING 390 Independent Study in Linguistics]
Fall or spring. 1-4 credits variable. Prerequisite: LING 101 or permission of instructor. Staff. Independent study of linguistics topics not covered in regular curriculum for undergrads.

[LING 400 Language Typology (III) (KCM)]
Spring. 4 credits. Prerequisite: LING 101 or equivalent. C. Rosen. This course studies a basic question of contemporary linguistics: in what ways do languages differ, and in what ways are they all alike? Efforts are made to formalize universals of syntax and to characterize the total repertory of constructions available to natural languages. Common morphological devices and their syntactic correlates are covered. Emphasis is on systems of case, agreement, and voice.

[LING 401-402 Phonology I, II (III) (KCM)]
401, fall; 402, spring. 4 credits each term. Prerequisites: for LING 401, LING 302 or equivalent; for LING 402, LING 401 or permission of instructor. Fall. A. Cohn; spring. D. Zec. 401 provides a basic introduction to phonological theory. The first half of the course focuses on basic principles of phonology, patterns of sounds, and their representations. In the second half, the nature of syllable structure and feature representations are explored. 402 provides further refinement of the issues investigated in 401, focusing in particular on metrical theory, lexical phonology, autosegmental phonology, and prosodic morphology.

[LING 403-404 Syntax I, II (III) (KCM)]
403, fall; 404, spring. 4 credits each term. Prerequisites: for LING 403, LING 303; for LING 404, LING 403 or permission of instructor. Fall, J. Bowers; spring. M. Diesing. 403 is an advanced introduction to syntactic theory within the principles and parameters/minimalist frameworks. The topics covered include phrase structure, argument structure (unaccusative verbs, unergative verbs, double object constructions), principles of word order, and the binding theory. 404 is a continuation of 403, 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 405 Sociolinguistics (III) (CA)]
Fall. 4 credits. Prerequisite: LING 101 or permission of instructor. S. McConnell-Ginet. The principal work of linguistics is to describe, analyze, and understand the regularities of language systems. How, then, are we to deal with irregularities and variability when they are observed in language? This course introduces and discusses the most significant issues in the study of language variation, and it examines some of the methodologies that have been developed to study variation in language use. We consider the observable interactions between linguistic variables and social factors (e.g., age, sex, ethnicity) and review the main generalizations about these factors that sociolinguistics has arrived at in the last three decades. Some of the problems associated with the quantification and measurement of nonlinearic variables are discussed and we evaluate the various ways researchers have dealt with these problems.

[LING 409 Structure of Italian (III) (KCM)]
Fall. 4 credits. Prerequisites: LING 101 or equivalent and qualification in any Romance language. Offered alternate years. Not offered 2004-2005; next offered 2005-2006. C. Rosen. Survey of Italian syntax, using simple theoretical tools to bring hidden regularities to
light. Topics include auxiliaries, modals, clitics, reflexive constructions, agreement, impersonal constructions, causatives.

**LING 410 History of the Italian Language (III) (HA)**
- Overview of Italian and its dialects from the earliest texts to the present day. Emergence of the standard language. External history and sociolinguistic circumstances.

**LING 411 History of the Japanese Language (also ASIAN 411 and JAPAN 410) @ III (II) (HA)**
- Fall. 4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 2004–2005. J. Whitman.
- An 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 412 Linguistic Structure of Japanese (also ASIAN 412) (III) (KCM)**
- Spring. 4 credits. Prerequisites: JAPAN 102 or permission of instructor and LING 101. Offered alternate years. Not offered 2004–2005. J. Whitman.
- Introduction to the linguistic study of Japanese, with an emphasis on morphology and syntax.

**LING 413 Applied Linguistics and Second Language Learning (III) (KCM)**
- Fall. 4 credits. Prerequisite: at least one course in applied linguistics, linguistics, psychology, anthropology, communication, cognitive studies, education, or literary analysis; or permission of instructor. Not offered 2004–2005; next offered 2005–2006. Y. Shirai.
- This course is an introduction to the field of applied linguistics with focus on different domains of language research as they come to bear on the matter of second language learning. Thus, topics include developmental and experimental psychology of language; textual and discourse analysis; literacy, cognitive consequences of bilingualism, corpora and language teaching, and contact between first and second language communities.

**LING 414 Second Language Acquisition I (also ASIAN 414) (III) (KCM)**
- Fall. 4 credits. Prerequisite: permission of instructor. Y. Shirai.
- A survey of the quantitative and qualitative research literature on the acquisition of second and additional languages among the adult population. Research carried out in both experimental and natural settings is considered. Topics include learner errors and errors analysis; contrastive analysis hypothesis; developmental and variability patterns in the acquisition of syntax, phonology and morphology, including the potential effects of typological and formal universals; pragmatics and discourse; the lexicon, social and cognitive factors in acquisition, communication, and learning strategies; theories of second language acquisition.

**LING 415 Second Language Acquisition II (also ASIAN 417) (III) (KCM)**
- Spring. 4 credits. Prerequisite: permission of instructor. Y. Shirai.
- This course examines various issues in second language acquisition research that are particularly relevant to foreign language teaching and learning. Topics include the role of input (listening/reading) vs. output (speaking/writing); implicit vs. explicit learning; negative vs. positive evidence (including the role of error correction); affective factors (motivation, anxiety); individual differences; teachability hypothesis and syllabus construction; the structure of second language proficiency.

**LING 416 Structure of the Arabic Language (also NES 416) (II) (II) (HA)**
- Not offered 2004–2005. For description, see NES 416.

**LING 417-418 History of the Russian Language (also RUSSA 401-402) (III) (II) (HA)**
- 417. fall. 418. spring. 4 credits each term. Prerequisites: LING 417. permission of instructor; for LING 418, LING 417 or equivalent. Offered alternate years. Not offered 2004–2005. W. Browne.
- Phonological, morphological, and syntactic developments from Old Russian to modern Russian.

**LING 419 Phonetics I (III) (KCM)**
- Fall. 4 credits. Prerequisite: LING 301 or permission of instructor. S. Hertz.
- This course 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 420 Phonetics II (III) (KCM)**
- This course is a continuation of Phonetics I and includes a more detailed survey of some areas in acoustic and articulatory phonetics. Topics include feature theory, vocal tract acoustics, quantal theory, speaker normalization, theories of speech perception, coarticulation, theories of speech production, and prosody. In addition, a number of "hands-on" projects are part of the course.

**LING 421 Semantics I (III) (KCM)**
- Spring. 4 credits. Prerequisite: LING 304. M. Rooth.
- This course introduces methods for theorizing about meaning within generative grammar. These techniques allow us to create grammars that pair syntactic structures with meanings. We 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 (such as set theory, functions and their types, and the lambda notation for naming linguistic meanings) is included in the course.

**LING 422 Semantics II (III) (KCM)**
- Fall. 4 credits. Prerequisite: LING 421 or permission of instructor. D. Abusch.
- The course 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, indefiniteness, descriptions, and anaphora are analyzed in a dynamic compositional framework that formalizes the idea that sentence meaning effects a change in an information state.

**LING 423 Morphology (III) (KCM)**
- Spring. 4 credits. Prerequisite: LING 101 or equivalent or permission of instructor. R. Hastings.
- This course addresses the basic issues in the study of words and their structures. It 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.

**LING 424 Computational Linguistics (also COGST 424 and COM S 324) (II) (MQR)**
- Fall. 4 credits. Prerequisite: LING 304 or permission of instructor; COM S 114 is also recommended. Not offered 2004–2005; next offered 2005–2006. M. Rooth.
- Steady progress in formalisms, algorithms, linguistic knowledge, and computer technology is bringing computational mastery of the syntax, morphology, and phonology of natural languages within reach. The course introduces methods for "doing a language" computationally, with an emphasis on approaches that combine linguistic knowledge with powerful computational formalisms. Topics include computational grammars, parsing, representation of syntactic analyses, finite state morphology, weighted grammars, feature constraint formalisms for syntax, treebank and other markup methodology, robust low-level syntax and semantics, and experimental-modeling methodology using large data samples.

**LING 425 Pragmatics (also PHIL 435) (III or IV) (KCM)**
- Spring. 4 credits. Prerequisite: LING 304 or PHIL 231, or permission of instructor. D. Abusch.
- An 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 427 Structure of Hungarian (also HUNGR 427) (III) (KCM)**
- Fall. 4 credits. Prerequisite: LING 101 or equivalent. Offered alternate years. W. Browne.
- Survey of phonology, morphology, and syntax of this non-Indo-European language. Topics to be stressed include vowel harmony, consonant assimilation; definite and indefinite conjunctions, possessives, verb prefixes, causatives; and focus, word order, clause types, movement, intonation.
LING 428/428 Connectionist Psycholinguistics (also COGST 428 and PSYCH 428/428) (III) (KCM)
For description, see PSYCH 428.

[LING 430 Structure of Korean (also ASIAN 430 and KOREA 430) (III) (KCM)]
Spring. 4 credits. Prerequisite: KOREA 102 or a previous course in linguistics. Offered alternate years. Not offered 2004–2005. 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. No previous knowledge of Korean required.

[LING 431 Structure of an African Language (III) (KCM)]

A survey of the grammar of an African language in light of current linguistic theory.

[LING 432 Middle Korean (also KRILIT 432) @ # IV (LA)]

An introduction to the premodern Korean language. The course focuses on the earliest hangeul/texts of the fifteenth century, but also introduces materials written in Korean using Chinese characters prior to the fifteenth 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 433 The Lesser-Known Romance Languages (also ROM S 433) (III) (KCM)
Spring. 4 credits. Prerequisites: LING 101 or equivalent and qualification in any Romance language. C. Rosen.

The course surveys three or four Romance languages or dialects, examining their sound systems, grammars, and historical evolution from Latin. Includes some native speaker demonstrations. Readings represent both the modern languages and their earliest attested stages.

LING 436 Language Development (also COGST 436, HD 436, and PSYCH 436) (III) (KCM)
Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HD 635/LING 700/PSYCH 600, a supplemental graduate seminar. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, biology, neurobiology, or linguistics. B. Lust.

This course surveys basic issues, methods, and research in the study of first-language acquisition. Major theoretical positions in the field are considered in light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental issues of relationships between language and thought are discussed, as are the fundamental linguistic issues of Universal Grammar and the biological foundations for language acquisition. The acquisition of communication systems in nonhuman species such as chimpanzees is addressed, but major emphasis is on the child. An optional lab course supplement is available (see COGST 450/LING 450/HD 437/PSYCH 437).

[ Ling 437 Celtic Linguistic Structures (III) (KCM)]

This course treats selected topics in the syntax and morphosyntax of the modern Celtic languages.

[LING 441 Introduction to Germanic Linguistics (also GERST 441) (III) (HA)]
Fall. 4 credits. Prerequisite: LING 101 or permission of instructor. Not offered 2004–2005. W. Harbert.

Survey of major issues in historical Germanic linguistics.

[LING 443-444 Linguistic Structure of Russian (also RUSSA 403-404) (III) (KCM)]
443, fall; 444, spring. 4 credits each term. Prerequisites: for LING 443, reading knowledge of Russian; for LING 444, LING 443 or equivalent. Offered alternate years; not offered 2004–2005. W. Browne.

A synchronic analysis of the structure of modern Russian. LING 443 deals primarily with phonology and its relation to syntax and 444 with syntax and word order.

LING 450 Lab Course: Language Development (also COGST 450, HD 437, and PSYCH 437)
Spring. 2 credits. Prerequisite: COGST/HD/LING/PSYCH 436. B. Lust.

This laboratory course provides undergraduates with an introduction to hands-on research experience in the Cognitive Studies research labs and meets once a week in group format. It includes several structured modules dealing with topics covered in the survey course COGST/HD/LING/PSYCH 436, Language Development. It includes training in how to study and analyze original child language data, including the use of selected portions of a large database of child language data from many languages in the Cornell Language Acquisition Lab (CLAD), and training necessary to the collection and analysis of new child language data. Emphasis is placed on developing research methods to test hypotheses.

[LING 451 Greek Comparative Grammar (also CLASS 421) (III) (KCM)]

The prehistory and evolution of the sounds and forms of ancient Greek as reconstructed by comparison with the other Indo-European languages.

LING 452 Latin Comparative Grammar (also CLASS 422) (III) (KCM)
Fall. 4 credits. Prerequisite: thorough familiarity with classical Latin morphology. M. Weiss.

The prehistory and evolution of the sounds and forms of classical Latin as reconstructed by comparison with the other Indo-European languages.

[LING 454 Celtic Dialects (also CLASS 424) (III) (KCM)]

The phonology and morphology of Faliscan, Oscan, and Umbrian studied through the reading of epigraphical texts. Attention to the relations of these languages to Latin and the question of proto-Italic.

[LING 455 Greek Dialects (also CLASS 425) (III) (KCM)]
Fall. 4 credits. Prerequisite: basic familiarity with classical Greek morphology. Not offered 2004–2005. A. Nussbaum.

A survey of the dialects of ancient Greek through the reading and analysis of representative epigraphical and literary texts.

LING 456 Archaic Latin (also CLASS 426) (III) (LA)
Spring. 4 credits. Prerequisite: reading knowledge of Latin. A. Nussbaum.

Reading of epigraphic and literary preclassical texts with special attention to archaic and dialectal features. The position of Latin among the Indo-European languages of ancient Italy, the rudiments of Latin historical grammar, and aspects of the development of the literary language.

[LING 457 Homeric Philology (also CLASS 427) (III) (LA)]

The language of the Homeric epics: dialect background, archaism, modernizations. The notion of a Kunstsprache: its constitution, use, and internal consistency. The phonological and morphological aspects of epic compositional technique.

[LING 459 Mycenaean Greek (also CLASS 429) (III) (LA)]

An introduction to the epigraphy, language, and content of the Linear B tablets with special attention to their implications for Greek historical grammar and dialectology.

[LING 460 Sanskrit Comparative Grammar (III or IV) (KCM)]

A survey of the historical phonology and morphology of Sanskrit in relation to the Indo-Iranian and Indo-European comparative evidence.

LING 474 Introduction to Natural Language Processing (also COGST 474 and COM S 474) (III)
Fall. 4 credits. Prerequisite: COM S 211 or permission of instructor. M. Rooth.

An introduction for students with computer science background. Relevant material in linguistics is covered. Includes computational phonology and other applications of finite state methods; context-free, probabilistic, and feature constraint syntax; parsing and statistical algorithms; corpus and markup methodologies.
LINGS 485 Topics in Computational Linguistics (II) (MQR)
This laboratory course is concerned with broad-coverage computational grammars, computational methodology for addressing linguistic questions, and programming and experimental environments for computational linguistics. Course work includes an experimental project.

LING 493 Honors Thesis Research
Fall. 4 credits. Staff.
May be taken before or after LING 494, or may be taken independently.

LING 494 Honors Thesis Research
Spring. 4 credits. Staff.
May be taken as a continuation of, or before, LING 493.

LING 501 Cognitive Science (also COGST 501, PHIL 501, and PSYCH 501)
For description, see COGST 501.

LING 530 Representation of Structure in Vision and Language (also COGST 530 and PSYCH 530)
Not offered 2004-2005. For description, see PSYCH 530.

LING 531 Topics in Cognitive Studies (also COGST 531 and PSYCH 531)
Not offered 2004-2005. For description, see COGST 531.

LING 600 Field Methods
Fall. 4 credits. Prerequisites: LING 401 and 403 or permission of instructor. A. Cohn, J. Whitman.
elicitation, recording, and analysis of data from a native speaker of a non-Western language not generally known to students.

LING 601 Topics in Phonological Theory
Fall. 4 credits variable. Prerequisites: LING 401 and one higher-level course in phonology. D. Zec.
Selected topics in current phonological theory.

LING 602 Topics in Morphology
Fall. 4 credits. Prerequisites: LING 401 or 403 or permission of instructor. Not offered 2004-2005. D. Zec.
Selected topics in current morphological theory.

LING 604 Research Workshop
Fall. 2 credits. S-U grade only. Required of third-year linguistics graduate students. A. Cohn.
This course 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 606 Historical Syntax
A course on change in language structure, beginning with an overview of widely attested types of syntactic change and proceeding to an introduction of current theoretical treatments. Topics include grammaticalization, word order change, and the interplay between morphological and syntactic change. Assumes a basic background in syntax.

LING 609 SLA and the Asian Languages (also ASIAN 610)
Fall. 4 credits. Prerequisites: LING 414-415 or permission of instructor. Not offered 2004-2005. Y. Shirai.
This course surveys the literature on the acquisition of Asian languages both in first and second language. We focus mainly on Japanese, Korean, Chinese (Mandarin/Cantonese), but other languages (e.g., Thai, Malay, Vietnamese, Burmese, Tagalog) may be dealt with, depending on faculty/student interest.

LING 615 Topics in Semantics
Fall. 4 credits. Prerequisites: LING 421 or permission of instructor. D. Abusch.
Selected topics in semantic theory, focusing on recent literature.

LING 616 Topics in Syntactic Theory
Fall. 4 credits variable. Prerequisite: LING 404 or permission of instructor. R. Hastings.
An 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 617-(618) Hittite
617, spring. [618]. 4 credits each term. Prerequisites: for LING 617, permission of instructor; for LING 618. LING 617 or permission of instructor. 618 not offered 2004-2005. M. Weiss.
An introduction to the cuneiform writing system and the grammar of Hittite, followed by the reading of selected texts.

LING 619 Rigveda
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2004-2005. C. Minkowski.
Reading and linguistic analysis of selected Vedic hymns.

LING 620 Comparative Grammar of Anatolian (also NES 623)
Introduction to the historical phonology and morphology of the Anatolian languages. Knowledge of Hittite and Luvian recommended but not required.

LING 621 Avestan and Old Persian (also NES 621)
Linguistically oriented readings of Old Persian and Avestan.

LING 623-624 Old Irish I, II
623, fall; 624, spring. 4 credits each term. Prerequisite for LING 624: LING 623 or permission of instructor. Not offered 2004-2005. Staff.
An introduction to “classical” Old Irish for students with no previous experience with the language.

LING 625 Middle Welsh
Students develop a reading knowledge of Middle Welsh through translating selections from prose and poetry. Emphasis is on the prose tales, including the Mabinogi. No familiarity with Welsh is assumed.

LING 627 Advanced Old Irish
LING 629 Old Avestan (also NES 622)
Linguistically and philologically oriented reading of the Gathas of Zarathustra and the Yasna Haphtanaiti. Some knowledge of Sanskrit required.

LING 631 Comparative Indo-European Linguistics
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2004-2005. Staff.
An introduction to the comparative grammar of the Indo-European languages.

LING 633 Language Acquisition Seminar (also COGST 633 and HD 633)
Fall. 1-4 credits. Prerequisite: LING 436 or equivalent or permission of instructor. B. Lust.
This seminar reviews and critiques current theoretical and experimental studies of first-language acquisition, with a concentration on insights gained by cross-linguistic study of this area. Attention is also given to the development of research proposals.

LING 635-636 Indo-European Workshop
635, fall; 636, spring. 4 credits each term. Prerequisite: permission of instructor. Not offered 2004-2005. M. Weiss.
An assortment of subjects intended for students with previous training in Indo-European linguistics: problems in the reconstruction of Proto Indo-European, topics in the historical grammars of the various IE languages, reading and historical linguistic analysis of texts, and grammatical sketches of “minor” IE languages.

LING 637 Introduction to Tocharian
Introduction to the grammar of Tocharian A and B.

LING 638 Comparative Grammar of Tocharian
Introduction to the historical phonology and morphology of Tocharian A and B.

LING 643 Topics in Historical Germanic Phonology
The development of the sound system from Proto-Germanic to its daughter languages.

LING 644 Topics in Historical Germanic Syntax
A diachronic and comparative investigation of syntactic processes in the older Germanic languages.

LING 645 Gothic
Linguistic structure of Gothic, with extensive readings of Gothic texts.
Seminars are offered according to faculty interest and student demand. Topics in recent years have included topics in Minimalism, diachronic syntax, markedness and phonological theory, the semantics of modification, phonetics vs. phonology, theoretical and experimental approaches, and the morphology-phonology interface. LING 701-702 Directed Research 701, fall, 702, spring. 1-4 credits. Hours to be arranged. Staff.

**MATHMATICS**

www.math.cornell.edu


Mathematics is the language of modern science: basic training in the discipline is essential for those who want to understand, as well as for those who want to take part in, the important scientific developments of our time. Acquaintance with mathematics is also extremely useful for students in the social sciences and valuable for anyone interested in the full range of human culture and the ways of knowing the universe in which we live.

The Department of Mathematics faculty has strong groups specializing in algebra, number theory, combinatorics, real and complex analysis, Lie groups, topology and geometry, logic, probability and statistics, mathematical physics, and applied mathematics. Related departments at Cornell have specialists in computer science, operations research, linear programming, and game theory, and courses in these topics can be integrated readily into the mathematics major.

The department offers a rich variety of undergraduate courses, and many of its beginning graduate courses are suitable for advanced undergraduates as well. Under some conditions, a student may carry out an independent reading and research project for college credit under the supervision of a faculty member.

Members of the department are available to discuss with students the appropriate course for their levels of ability and interest, and students are urged to avail themselves of this help. Students who want to take any of the courses numbered 300 or above are invited to confer, before registering, with the instructor concerned. The level of a course is indicated by the first digit of the course number, roughly, 1, 2, indicate underclass courses; 3, 4, upperclass courses; 5, professional level and mathematics education courses; 6, 7, graduate courses. The subject matter of courses is often indicated by the second digit: 0, general; 1, 2, analysis; 3, 4, algebra and combinatorics; 5, 6, topology and geometry; 7, probability and statistics; 8, logic; 9, other.

Midterm grades, when required, will be S or U only, except in special circumstances. In courses with numbers below 700, students will receive letter grades, with the exception of nonmathematics majors who have requested an S-U grade.

**Advanced Placement**

Secondary school students are strongly urged to take one of the two advanced placement examinations of the College Entrance Examination Board in their senior year. Freshmen who have had some calculus but who have not taken an advanced placement examination should take the placement examination in mathematics offered at Cornell just before the beginning of classes in the fall. It is most important that anyone with any knowledge of calculus carefully read "Advanced Placement," p. 6-11.

**The Major**

The mathematics major adapts to a number of purposes. It can emphasize the theoretical or the applied. It can be appropriate for professionals and nonprofessionals alike, and can be broad or narrow. It can also be combined easily with serious study in another subject in the physical, biological, or social sciences by means of a double major and/or concentration. For example, a double major in mathematics and computer science is facilitated by the concentration in computer science (requirement 4, option b) described below. This concentration permits a student to use certain computer science courses to satisfy the requirements of both majors. Questions concerning the major should be brought to a departmental representative.

**Prerequisites**

The traditional prerequisites are MATH 221-222, 223-224, or 293-294. A unit on infinite series is required. Such a unit is offered in MATH 112, 122, 190/191 (if taken before fall 2004), and 192 (if taken fall 2004 or later).

Normally students will be admitted to the major only when they have grades of B- or better in all 200-level mathematics courses taken. Alternative prerequisites are MATH 213 and 231, normally with grades of B+ or better.

**Requirements**

There are five requirements for the major:

1) COM S 100. Students are urged to take this course before the end of their sophomore year.

2) Two courses in algebra. Eligible courses are

- MATH 431 or 433
- MATH 432 or 434
- MATH 332 or 336

(Credit for both MATH 332 and MATH 336 will be granted only if both were taken during or before spring 2002.)
3) Two courses in analysis. Eligible courses are MATH 311, 321, 323, 413, 414, 418, 420, 422, 424, 425, 428.

4) Further high-level mathematical courses. Any one of (a)-(g) below is sufficient. The seven alternatives 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/her major adviser.

(a) Four additional mathematics courses numbered 300 or above.

(b) Concentration in Computer Science: Five additional courses from (i) and (ii) below, of which at least one is from (i) and three are from (ii)

(i) Mathematics courses numbered 300 or above.

(ii) Computer science courses numbered 300 or above.

(c) Concentration in Economics: Five additional courses from (iii), (iv), and (v) below, as follows: one course from (iii), three courses from (iv), and a fifth course from any of (iii), (iv), or (v). However, MATH 472 and ECON 319 cannot both be used to satisfy these requirements.

(iii) Mathematics courses numbered 300 or above.

(iv) Economics courses with significant mathematical content. Eligible courses are ECON 319, 320, 325, 368 (formerly 467), 416, 419, 450 (also ARME 450), 609, 610, 613, 614, 619, 620, 717, 756.

(v) Courses in operations research with significant mathematical content and dealing with material of interest in economics; e.g., OR&IE 320, 321, 432, 435, 474, and 476. However, the student may, with the advisor's approval, select an OR&IE course that satisfies the basic intent of the requirement but is not in this list.

(d) Concentration in Mathematical Biology: Five additional courses from (vi) and (vii) below, with three courses from (vi) and two courses from (vii). We suggest that the student take a fourth course from (vi) to satisfy the math modeling requirement.

(vi) Biology courses that have mathematical content or provide background necessary for work at the interface between biology and mathematics. Examples include BIOB/M COM S 521, BIOE/MATH 362, BIOE 460, BIOGD 481, 484, 487, BIOGD 320, 422, BTRY 381, 482.

(vii) Mathematics courses numbered above 300. Particularly appropriate are MATH 420 and 471.

(e) Concentration in Mathematical Physics: Five additional courses from (viii) and (ix) below, of which at least one is from (viii) and three are from (ix).

(viii) Mathematics courses in analysis, geometry, algebra, number theory, analysis, probability and statistics, and mathematical logic. Eligible courses are MATH 311, 321, 323, 401, 413, 414, 420, 418 or 422, 424, 425, 428, 431, or 433, 432 or 434, 435, 442, 451, 452, 453, 454, 455, 471, 472, 481, 482, 483, 486.

(ix) Physics courses that make significant use of advanced mathematics. Eligible courses are PHYS 316, 317, 318, 327, 341, 453, 444, 454, 455, 480.

(f) Concentration in Operations Research: Five additional courses from (x) and (xi) below, of which at least one is from (x) and three are from (xi)

(x) Mathematics courses numbered 300 or above.

(xi) Courses in operations research in which the primary focus involves mathematical techniques. Undergraduate courses include OR&IE 320-462, excluding OR&IE 350, 410, and 452. Many operations research graduate courses are also allowed. Students should consult with their advisers.

(g) Concentration in Statistics: Five additional courses from (xii), (xiii), and (xiv) below, which include both from (xii) and at least two from (xiii). MATH 471 is recommended as an additional course, not counting towards the requirements. It should be taken, or audited, before or simultaneously with MATH 471.

(xii) Mathematics courses numbered 300 or above.

(xiii) MATH 471 and 472.

xiv) Courses in other departments with significant content in probability and statistics, complementing (xii). Eligible courses are BTRY 302 and 482, OR&IE 361, 462, 464, 468, 469, 473, 474, and 476 (counted as half a course here); ILRST 312, 410, and 411; and ECON 320.

Many graduate courses co-listed in the Department of Statistical Science are also allowed (e.g., BTRY 602, 603, and 604). Students should consult their advisors.

5) One course dealing with mathematical models. Any course from outside mathematics with serious mathematical content and dealing with scientific matters. This course cannot be used to satisfy any of the other requirements for the major. Serious mathematical content includes, but is not limited to, extensive use of calculus or linear algebra. Even if the Physics concentration has been selected, PHYS 316, 208, 213, or 217 may be used to satisfy the modeling requirement, but no other 100-level Physics course, nor PHYS 207 or 209 may be used. COM S 211 satisfies the modeling requirement provided the Computer Science concentration has not been selected. Any course from another department that would satisfy one of the concentrations requirements may be used to fulfill the modeling requirement, provided the course is not also used to fulfill the concentration requirement. Some courses in biology, chemistry and other fields can fulfill the modeling requirement. Students should consult with their advisers.

A course may be counted toward the mathematics major only if it is taken for a better grade and a grade of C- or better is received for that course.

Major advisers can alter these requirements upon request from an advisee; provided the intent of the requirements is met.

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 cover significant areas of mathematics not covered in course work, or not covered there in sufficient depth. The work should be both independent and creative. It can involve the solution of a serious mathematics problem, or it can be an expository work, or variants of these. Both the process of doing independent research and mathematics exposition, as well as the finished written product and optional oral presentation, can have a lasting positive impact on a student's educational and professional future.

Double Majors
The Departments of Computer Science, Economics, and Physics all permit double majors with the mathematics major, allowing the courses listed under the corresponding concentrations above to be counted for both majors. Students should consult the appropriate departments for any further conditions.

Honors Program
The Department of Mathematics awards honors (cum laude) and high honors (magna cum laude and summa cum laude) to graduating mathematics majors who have demonstrated outstanding ability in the major program. The awards are determined by the Mathematics Major Committee in the latter part of the semester prior to graduation. The committee will primarily be looking for excellent performance in mathematics courses, particularly in challenging courses at the 400 level or beyond. Participation in the Honors Seminar (MATH 401) for one semester, or independent study at a high performance level can also contribute to honors. Students interested in honors should consult their major advisors concerning suitable courses. Outstanding performance in graduate classes or an excellent senior thesis can also contribute to high honors. Students interested in high honors should consult their major advisors and the chair of the department's Mathematics Major Committee during the second semester of their junior year.
Teacher Education in Mathematics
Students at Cornell may pursue teaching credentials in biology, chemistry, earth science, general science, mathematics, and physics. CTE (Cornell Teacher Education) is a program situated in the Department of Education. Most CTE students enroll in a five-year program, which combines an undergraduate major in mathematics or one of the sciences with a one-year Master of Arts in Teaching (MAT). Students from any college at Cornell are eligible to apply to the program as undergraduates. Students completing the graduate program will earn the master's degree requirement for certification in New York and most other states. Mathematics students in CTE must complete all the requirements for a mathematics major (or its equivalent) including MATH 403, 408, 451, 507, and a probability/statistics course. There are a number of education courses required. Some of the required mathematics and education courses will be taken in the graduate fifth year.

For more information, contact the CTE student support specialist at 255-9255 or David Bock (Mathematics, bock@math.cornell.edu) or David Henderson (Mathematics, dwh2@cornell.edu).

Studying Mathematics Outside the Major
The College of Arts and Sciences and the Department of Mathematics offer non-mathematics students a minor in mathematics. This minor is open to any undergraduate studying in the arts and sciences. The minor is administered by the latter department. The courses for the minor consist of five required courses and six electives, which must be approved by the department. The courses for the minor are as follows: MATH 100 Calculus Preparation, MATH 105 or MATH 111, MATH 109 or MATH 112, MATH 111 or MATH 112, and MATH 121. Students interested in a minor in mathematics after EDUC 115 or MATH 100 may take MATH 105 or, if they need calculus, MATH 106 or 111.

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.

106, 111, 121
112, 122, 190, 191
192, 213, 222, 224
221, 231, 294
332, 335, 336*
431 and 433
432 and 434
*Credit for both MATH 332 and MATH 336 will be granted only if both were taken during or before Spring 2002.

Note: Courses with overlapping content are not necessarily equivalent courses. Students are encouraged to consult a mathematics faculty member when choosing between them.

Basic Sequences

<table>
<thead>
<tr>
<th>Description</th>
<th>Courses</th>
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<tbody>
<tr>
<td>Precalculus</td>
<td></td>
</tr>
<tr>
<td>1) Algebra and trigonometry to prepare students for calculus</td>
<td></td>
</tr>
<tr>
<td>MATH 109 or EDUC 005*</td>
<td></td>
</tr>
<tr>
<td>2) Algebra, analytic geometry, elements of calculus</td>
<td></td>
</tr>
<tr>
<td>EDUC 115, MATH 100*</td>
<td></td>
</tr>
<tr>
<td>*MATH 100, MATH 109, EDUC 005, and EDUC 115 do not carry credit for graduation in the Arts College. Students who want a second semester of mathematics after EDUC 115 or MATH 100 may take MATH 105 or, if they need calculus, MATH 106 or 111.</td>
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<tbody>
<tr>
<td>Calculus</td>
<td></td>
</tr>
<tr>
<td>1) Standard three-semester sequence for students who do not expect to take advanced courses in mathematics</td>
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</tr>
<tr>
<td>111–112–213</td>
<td></td>
</tr>
<tr>
<td>2) Calculus for engineers (also taken by some physical science majors)</td>
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<tr>
<td>190/191–192–293–294</td>
<td></td>
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<tr>
<td>3) Several sequences are possible for prospective mathematics majors and others who expect to take advanced courses in mathematics: 111–112–221–222, 111–122–222–223–224–225 or some mix of these courses. Students may also take the engineering sequence 190/191–192–293–294. Students are encouraged to consult with their advisers.</td>
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</tr>
<tr>
<td>MATH 190 or 191 may be substituted for 112. The two-year sequences include some linear algebra. Students who take the three-semester sequence 111–112–213 may learn some linear algebra by taking MATH 231.</td>
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Special-Purpose Sequences

<table>
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<tr>
<th>Description</th>
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<tbody>
<tr>
<td>1) Finite mathematics and calculus for life and social science majors</td>
<td></td>
</tr>
<tr>
<td>105–106</td>
<td></td>
</tr>
<tr>
<td>2) Other possible finite mathematics and calculus sequence</td>
<td></td>
</tr>
<tr>
<td>105–111</td>
<td></td>
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<tr>
<td>3) Calculus and statistics sequences</td>
<td></td>
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<tr>
<td>106–171, 111–171</td>
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</tbody>
</table>

Students who want to take two semesters of calculus are advised to take the first two semesters of one of the three calculus sequences. Students with excellent performance in MATH 106 may follow that course with MATH 112 or 122. The courses in each of the calculus and statistics sequences may be taken in either order, since no calculus background is required for MATH 112 or 122. Each of the sequences listed here satisfies the mathematics requirement for most medical schools.

Switching between calculus sequences is often difficult, especially at the 200 level. Students should not attempt such a switch without consulting the director of undergraduate studies.

Courses

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<tbody>
<tr>
<td>Mathematics Courses</td>
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<tr>
<td>1) Finite mathematics and calculus for life and social science majors</td>
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<tr>
<td>105–106</td>
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<tr>
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Switching between calculus sequences is often difficult, especially at the 200 level. Students should not attempt such a switch without consulting the director of undergraduate studies.

Summer Courses
A list of mathematics courses usually offered every summer can be found in the School of Continuing Education and Summer Sessions section of this catalog. Students interested in taking summer courses in mathematics should consult the Mathematics Department website (www.math.cornell.edu). A tentative summer listing may be available as early as October.

Undergraduate Course Offerings
Please visit www.math.cornell.edu for further information and up-to-the-minute course information.

Foundation courses: 105, 106, 111, 112, 121, 122, 190, 191, 213, 221, 222, 223, 224, 231, 293, 294

Mathematics Education: 408, 451

History of Mathematics: 403

General and Liberal Arts Courses: 105, 135, 171, 304, 401, 409

Analysis: 311, 413, 414, 418

Algebra and Number Theory: 332, 335, 336, 431, 432, 433, 434

Combinatorics: 441, 442

Geometry and Topology: 356, 451, 452, 453, 454, 455

Probability and Statistics: 171, 275, 471, 472

Mathematical Logic: 281, 384, 481, 482, 483, 486


MATH 100 Calculus Preparation
Fall. 2 transcript credits only. This course cannot be used toward graduation.

This course introduces a wide variety of topics of algebra and trigonometry that have applications in various topics. 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 are addressed in problem-solving activities.

MATH 103 Mathematical Explorations (II) (MQR)
Fall, spring, summer. 3 credits.
This course is for students who wish to experience how mathematical ideas naturally evolve. The homework consists of the students actively investigating mathematical ideas. The course emphasizes ideas and imagination as opposed to techniques and calculations. Topics vary depending on the instructor and are announced (www.math.cornell.edu) several weeks before the semester begins. Some assessment is done through writing assignments.

MATH 105 Finite Mathematics for the Life and Social Sciences (II) (MQR)
Fall. 3 credits. Prerequisite: 3 years of high school mathematics, including trigonometry and logarithms.
This course is an introduction to linear algebra, probability, and Markov chains which 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. Examples from biology and the social sciences are used.

MATH 106 Calculus for the Life and Social Sciences (II) (MQR)
Spring. 3 credits. Prerequisite: readiness for calculus, such as can be obtained from 3 years of high school mathematics (including trigonometry and logarithms) or from MATH 100, MATH 109, or EDUC 115. MATH 111, rather than 106, is recommended for those planning to take 112.*
Course serves as an introduction to differential and integral calculus, partial derivatives, elementary differential equations. Examples from biology and the social sciences are used.

MATH 109 Precalculus Mathematics
Summer. 3 transcript credits only; cannot be used toward graduation.
The course is designed to prepare students for MATH 111. Algebra, trigonometry, logarithms, and exponentials are reviewed.

MATH 111 Calculus I (II) (MQR)
Fall, spring, summer. 4 credits.
Prerequisite: MATH 109 or 3 years of high school mathematics, including trigonometry and logarithms.*
Course 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 111 can serve as a one-semester introduction to calculus or as part of a two-semester sequence in which it is followed by MATH 112 or 122.

MATH 112 Calculus II (II) (MQR)
Fall, spring. 4 credits.
Prerequisite: MATH 111 with a grade of C or better or a change of major to a mathematics-related field should take 122 instead of 112.*

Course focus is 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 covered are infinite sequences and series: definition and tests for convergence; power series, Taylor series with remainder, and parametric equations.

MATH 121 Honors Calculus I (II) (MQR)
Fall. 4 credits. Prerequisite: 3 years of high school mathematics with average grade of A- or better, or permission of the department.*
This is a first-semester course in calculus intended for students who have been successful in their previous mathematics courses. The syllabus for the course is similar to that of MATH 111; however, the approach is more theoretical and the material is covered in greater depth.

MATH 122 Honors Calculus II (II) (MQR)
Fall, spring. 4 credits. Prerequisite: 1 semester of calculus with a high performance or permission of the department.*
This course is a second course in calculus. Topics include more theoretical than that in MATH 112. Topics include integration and differentiation of elementary transcendental functions, techniques of integration, applications, polar coordinates, infinite series, and complex numbers, as well as an introduction to proving theorems.

MATH 135 The Art of Secret Writing (II) (MQR)
Fall. 3 credits. Prerequisite: 3 years of high school mathematics.

MATH 171 Statistical Theory and Application in the Real World (II) (MQR)
Fall, spring. 4 credits. Prerequisite: high school mathematics. No credit if taken after ECON 319, 320, or 321.

This introductory statistics course discusses 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. (No previous familiarity with computers is presumed.)

MATH 190 Calculus for Engineers (II) (MQR)
Fall. 4 credits. Prerequisite: 3 years of high school mathematics, including trigonometry and logarithms and at least one course in differential and integral calculus.*
This course covers the same material as MATH 191 but is meant for students with less preparation. This course has changed significantly from last year, and is 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 191 Calculus for Engineers (II) (MQR)
Fall, spring, summer. 4 credits.
Prerequisite: 3 years of high school mathematics including trigonometry and logarithms and at least one course in differential and integral calculus.
This course has changed significantly from last year, and is 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 192 Calculus for Engineers (II) (MQR)
Fall, spring, summer. 4 credits.
Prerequisite: MATH 190 or 191.*
This course is an introduction to multivariable calculus. Topics include: calculus of functions of several variables, double and triple integrals, line integrals, vector fields, Green's theorem, Stokes' theorem, and the divergence theorem.

MATH 213 Calculus III (II) (MQR)
Fall, spring. 4 credits. Prerequisite: MATH 112, 122, 190, or 191.*
This course is 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 the syllabus in different semesters.

MATH 221 Linear Algebra and Differential Equations (II) (MQR)
Fall, spring. 4 credits. Prerequisite: 2 semesters of calculus with high performance or permission of the department.*

*See the list of courses with overlapping content at the end of the introduction.
This course is recommended for students who plan to major in mathematics or in a related field. Course covers linear algebra and differential equations. Topics include vector algebra, linear transformations, matrices, and linear differential equations, as well as an introduction to proving theorems.

**MATH 222 Multivariable Calculus (II) (MQR)**
Fall, spring. 4 credits. Prerequisite: MATH 221.*
This course is recommended for students who plan to major in mathematics or in a related field. It covers differential and integral calculus of functions in several variables, line and surface integrals as well as the theorems of Green, Stokes, and Gauss.

**MATH 223 Theoretical Linear Algebra and Calculus (II) (MQR)**
Fall. 4 credits. Prerequisite: 2 semesters of calculus with a grade of A or better, or permission of instructor.*
MATH 222-224 provides an integrated treatment of linear algebra and multivariable calculus designed for students who have been highly successful in their previous calculus courses. Topics include vectors, matrices, and linear transformations; differential calculus of functions of several variables; inverse and implicit function theorems; quadratic forms, extrema, and manifolds, multiple and iterated integrals.

**MATH 224 Theoretical Linear Algebra and Calculus (II) (MQR)**
Spring. 4 credits. Prerequisite: MATH 223.*
Topics include vector fields; line integrals; differential forms and exterior derivative; work, flux, and density forms; integration of forms over parametrized domains; and Green’s, Stoke’s, and divergence theorems.

**MATH 231 Linear Algebra with Applications (II) (MQR)**
Spring. 3 credits. Prerequisite: MATH 111 or equivalent.* Students interested in the mathematics major should take MATH 221 or 294. This course is an introduction to linear algebra. 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 275 Living in a Random World (II) (MQR)**
Spring. 3 credits. Prerequisites: one semester of calculus.
This course concentrates on applications of probability in the physical, biological, and social sciences, and to understanding the world around us (e.g., games, lotteries, option pricing, and opinion polls). Some familiarity with integration and differentiation is useful but the equivalent of a one-semester course in calculus is more than enough.

**MATH 281 Deductive Logic (also PHIL 331) (II) (NQR)**
Fall. 4 credits. For description, see PHIL 331.

**MATH 293 Engineering Mathematics (II) (MQR)**
Fall, spring, summer. 4 credits. Prerequisite: MATH 192.*
In Fall— the completion of vector calculus, including line integrals, vector fields, Green’s theorem, Stokes’ theorem, and the divergence theorem; followed by an introduction to ordinary and partial differential equations, including Fourier series and boundary value problems. May include computer use in solving problems.

In spring and summer: 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 294 Engineering Mathematics (II) (MQR)**
Fall, spring, summer. 4 credits. Prerequisite: MATH 192.*
Linear algebra and its applications. Topics include matrices, determinants, vector spaces, eigenvalues and eigenvectors, orthogonality, and inner products spaces. Applications include brief introductions to difference equations, Markov chains, and systems of linear ordinary differential equations. May include computer use in solving problems.

**MATH 304 Prove It! (II) (MQR)**
Spring. 4 credits. Prerequisite: MATH 221, 223, 293, or permission of instructor.
In mathematics, the methodology of proof provides a central tool for confirming the validity of mathematical assertions, functioning much as the experimental method does in the physical sciences. In this course, students will learn various methods of mathematical proof, starting with basic techniques in propositional and predicate calculus and in set theory and combinatorics, and then moving to applications and illustrations of these via topics in the three main pillars of mathematics: algebra, analysis, and geometry. Since cogent communication of mathematical ideas is important in the presentation of proofs, the course will emphasize clear, concise exposition. This course will be useful for all students who wish to improve their skills in mathematical proof and exposition, or who intend to study more advanced topics in mathematics.

**MATH 311 Introduction to Analysis (II) (MQR)**
Fall, spring. 4 credits. Prerequisites: MATH 221-222, 223-224, or 293-294, or permission of instructor.
This course is recommended for students who plan to major in mathematics or in a related field. Course covers linear algebra and its applications. Topics include matrices, determinants, vector spaces, eigenvalues and eigenvectors, orthogonality, and inner products spaces. Applications include brief introductions to difference equations, Markov chains, and systems of linear ordinary differential equations. May include computer use in solving problems.

**MATH 321 Manifolds and Differential Forms (II) (MQR)**
Fall. 4 credits. Prerequisites: multivariable calculus and linear algebra as taught in MATH 221-222, 223-224, or 293-294, or permission of instructor.
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, we investigate manifolds and the structures that they are endowed with, such as tangent vectors, boundaries, orientations, and differential forms. The notion of a differential form coalesces 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. We re-examine the integral theorems of vector calculus (Green’s, Gauss’s, and Stokes) in the light of differential forms and apply them to problems in partial differential equations, topology, fluid mechanics, and electromagnetism.

**MATH 323 Introduction to Differential Equations (II) (MQR)**
Fall. 4 credits. Prerequisites: multivariable calculus and linear algebra as taught in MATH 221-222, 223-224, or 293-294, or permission of instructor.
This course is intended for students who want a brief one-semester introduction to the theory and techniques in both ordinary and partial differential equations. Topics include initial-value and two-point boundary value problems, the basic existence and uniqueness theorems, continuous dependence on data, stability of fixed points, the method of characteristics, special functions. Topics for partial differential equations may include the Poisson, heat and wave equations, boundary and initial-boundary value problems, maximum principles, Green’s functions, separation of variables, Fourier series and Green’s theorem, transform methods.

**MATH 332 Algebra and Number Theory (II) (MQR)**
Fall. 4 credits. Prerequisite: MATH 221-222, 223-224 or 293-294.
Course covers various topics from number theory and modern algebra. It 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 the Gaussian integers and quadratic fields. Motivation and examples for the concepts of abstract algebra are derived primarily from number theory and geometry.

**MATH 335 Introduction to Cryptology (also COM S 480) (III) (MQR)**
Fall, spring. 3 credits. Prerequisites: MATH 222 or 294, and COM S 100 or equivalent.
This course is an introduction to the algorithmic and mathematical concepts of cryptography. Topics will include security vs. feasibility and different types of cryptographic attack, elementary probability, number theory, cryptographic hash functions, and secret and public key cryptography.

*See the list of courses with overlapping content at the end of the introduction.*
MATH 336  Applicable Algebra (II) (MQR)
Spring. 4 credits. Prerequisite: MATH 221, 223, 231 or 294.
An introduction to the concepts and methods of abstract algebra and number theory that are of interest in applications. Course covers the basic concepts of groups, rings and fields and their applications to such areas as public-key cryptography, error-correcting codes, parallel computing, and experimental designs. Applications include the RSA cryptosystem and use of finite fields to construct error-correcting codes and Latin squares. Topics include elementary number theory, Euclidean algorithm, prime factorization, congruences, theorems of Fermat and Euler, elementary group theory. Chinese remainder theorem, factorization in the ring of polynomials, and classification of finite fields.

MATH 356  Groups and Geometry (II) (MQR)
Spring. 4 credits. Prerequisite: MATH 221, 223, 231 or 294.
Groups were introduced in the nineteenth century as the sets of symmetries of algebraic or geometric objects. This viewpoint has become central in modern mathematics. This course studies the geometry of the plane and of patterns in the plane in terms of the group of symmetries ("isometries") of the plane. Prior knowledge of group theory is not a prerequisite. The purpose of the course is to prepare students for the 400-level courses in several ways. On one hand, the course offers experience in modern algebra and geometry (including the geometry of complex numbers). It presents some very beautiful and important topics and a sense of the unity of mathematics. On the other hand, special care is taken to initiate the student into the writing of proofs and the language of mathematics. Topics include: symmetries, groups of transformations, subgroups and cosets. Homomorphisms and isomorphisms. Orbits and fixed points. Frieze groups, wallpaper groups ("2-dimensional crystallographic groups") and the associated tessellations of the Euclidean plane.

[MATH 362  Dynamic Models in Biology (also BIOEE 362) (I or II) (PBS)
Spring. 3 credits. Prerequisite: two semesters of introductory biology (BIO G 101-102, 105-106, 107-108, 109-110, or equivalent) and completion of the mathematics requirements for the Biological Sciences major or equivalent. Not offered: 2004–2005.
For description, see BIOEE 362.

MATH 364  Foundations of Mathematics (also PHIL 330)
Fall. 4 credits. Prerequisite: one course on logic or one mathematics course that consists mostly of proofs, or permission of the instructor.
For description, see PHIL 330.

MATH 401  Honors Seminar: Topics in Advanced Mathematical Physics (I) (II) (MQR)
Spring. 4 credits. Prerequisite: 2 courses in mathematics numbered 300 or higher or permission of instructor.
This course is a participatory seminar primarily aimed at introducing senior and junior mathematics majors to some of the challenging problems and areas of modern mathematics. The seminar 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 (e.g., pure or applied mathematics, physical or biological sciences, business, engineering, medicine). The content varies from year to year.

MATH 402  History of Mathematics (I) (II) (MQR)
Spring. 4 credits. Prerequisite: two courses in mathematics above 300, 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.

MATH 408  Mathematics in Perspective (II) (MQR)
Spring. 4 credits. Prerequisite: consent of instructor.
This course 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. The course will emphasize 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 will relate 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 413  Honors Introduction to Analysis I (II) (MQR)
Fall, spring. 4 credits. Prerequisite: a high level of performance in MATH 221-222, 223-224, or 293-294 and a familiarity with proofs. Students interested in the applications of complex analysis should consider MATH 422.
This course provides an introduction to the rigorous theory underlying calculus, covering the real number system and functions of one variable. The course is based entirely on proofs, and 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 414  Honors Introduction to Analysis II (II) (MQR)
Spring. 4 credits. Prerequisite: MATH 413.
This is a 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 418  Introduction to the Theory of Functions of One Complex Variable (I) (II) (MQR)
Spring. 4 credits. Prerequisite: MATH 223-224, 311, or 413 or permission of instructor.
A theoretical and rigorous introduction to complex variable theory. Topics include complex numbers, differential and integral calculus for functions of a complex variable including Cauchy’s theorem and the calculus of residues, elements of conformal mapping. Students interested in the applications of complex analysis should consider MATH 422.

MATH 420  Differential Equations and Dynamical Systems (II) (MQR)
Fall, spring. 4 credits. Prerequisite: high level of performance in MATH 293-294, 221-222, 223-224, or permission of instructor.
Course 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 422  Applied Complex Analysis (II) (MQR)
Spring. 4 credits. Prerequisite: MATH 221-222, 223-224, 293-294, or 215 and 231.
Undergraduates who plan to attend graduate school should take MATH 418. Course covers complex variables, Fourier transforms, Laplace transforms and applications to partial differential equations. Additional topics may include an introduction to generalized functions.

MATH 424  Wavelets and Fourier Series (II) (MQR)
Spring. 4 credits. Prerequisite: MATH 221-222, 223-224, 293-294, 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. In 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 425  Numerical Analysis and Differential Equations (II) (MQR)
Fall. 4 credits. Prerequisite: MATH 221-222, 223-224, or 293-294, one course numbered 300 or higher in mathematics and COM S 100, or permission of instructor.
An introduction to the fundamentals of numerical analysis: error analysis, interpolation, direct and iterative methods for systems of equations, 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 428 Introduction to Partial Differential Equations (II) (MQR)
Spring. 4 credits. Prerequisite: MATH 221-222, 223-224, or 293-294 or permission of instructor.
Topics will be 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 431 Linear Algebra (II) (MQR)
Fall. 4 credits. Prerequisite: MATH 221, 223, 231, or 294. Undergraduates who plan to attend graduate school in mathematics should take MATH 433-434.*
An 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 432 Introduction to Algebra (II) (MQR)
Spring. 4 credits. Prerequisite: MATH 332, 336, 431 or 433, or permission of instructor. Undergraduates who plan to attend graduate school in mathematics should take MATH 433-434.*
An introduction to various topics in abstract algebra, including groups, rings, fields, factorization of polynomials and integers, congruences, and the structure of finitely generated abelian groups. Optional topics are modules over Euclidean domains and Sylow theorems.

MATH 433 Honors Linear Algebra (II) (MQR)
Fall. 4 credits. Prerequisite: a high level of performance in MATH 221, 223, 231, or 294.
This is the 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. A less theoretical course that covers approximately the same subject matter is MATH 431.

MATH 434 Honors Introduction to Algebra (II) (MQR)
Spring. 4 credits. Prerequisite: MATH 332, 336, 431 or 433, or permission of instructor.
This is the 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

MATH 441 Introduction to Combinatorics I (II) (MQR)
Fall. 4 credits. Prerequisite: MATH 221, 223, 231, or 294. Generally offered every two years.
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 applications. Central concerns are often to count objects having a particular property (for example, trees) or to prove that certain structures exist (for example, 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 442 Introduction to Combinatorics II (II) (MQR)
This is a continuation of the first semester, although formally independent of the material covered there. Emphasis is on the study of certain combinatorial structures, such as Latin squares and combinatorial designs (which are of use in statistical experimental design), and classical finite geometries and combinatorial geometries (also known as matroids, which arise in many areas from algebra and geometry through discrete optimization theory). There is an introduction to partially ordered sets and lattices, including general Möbius inversion and an introduction to the theory of posets as well as the Polya theory of counting in the presence of symmetries.

MATH 451 Euclidean and Spherical Geometry (II) (MQR)
Fall. 4 credits. Prerequisite: MATH 221, 223, 231, or 294, or permission of instructor.
Covers topics from Euclidean and spherical (non-Euclidean) geometry. A nonlecture, seminar-style course organized around student participation.

MATH 452 Classical Geometries (II) (MQR)
Spring. 4 credits. Prerequisite: MATH 221, 223, 231, or 294, or permission of instructor.
This is an 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 cannot 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 453 Introduction to Topology (II) (MQR)
Fall. 4 credits. Prerequisite: MATH 311, 411 or 413, or permission of instructor.
Course covers basic point set topology, connectedness, compactness, metric spaces, fundamental group. Application of these concepts to surfaces such as the torus, the Klein bottle, and the Möbius band.

MATH 454 Introduction to Differential Geometry (II) (MQR)
Spring. 4 credits. Prerequisites: MATH 221-222, 223-224, or 293-294, plus at least one mathematics course numbered 300 or above. MATH 454 is not a prerequisite. Course covers differential geometry of curves and surfaces. Also covers curvature, geodesics, and differential forms. Serves as an introduction to n-dimensional Riemannian manifolds. This material provides some background for the study of general relativity; connections with the latter are indicated.

MATH 455 Applicable Geometry (II) (MQR)
Fall. 4 credits. Prerequisite: a good introduction to linear algebra (such as in MATH 221, 223, 231, or 294) or permission of the instructor. It is not assumed that students know what any of the words in the following description mean. Generally offered every two years.
An 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 3-dimensions. We discuss both combinatorial properties (such as face counts) as well as metric 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. We relate these ideas to applications in tiling, linear inequalities and linear programming, structural rigidity, computational geometry, hyperplane arrangements and zonotopes.

MATH 471 Basic Probability (II) (MQR)
Fall. 4 credits. Prerequisites: one year of calculus. Some knowledge of multivariate calculus is helpful but not necessary.
An introduction to probability theory, which prepares the student to take MATH 472. 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 472 Statistics (II) (MQR)
Spring. 4 credits. Prerequisites: MATH 471 and knowledge of linear algebra such as taught in MATH 221. Some knowledge of multivariable calculus helpful but not necessary.
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 covered 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 481 Mathematical Logic (also PHIL 431)** (II) \(MQR\)
Spring. 4 credits. Prerequisites: MATH 222 or 223 and preferably some additional course involving proofs in mathematics, computer science, or philosophy. Generally offered every two years. A 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 about arithmetic. The compactness theorem exploits the finiteness of proofs to show that theories have uninterpreted (nonstandard) models. Possible additional topics: the mathematical definition of an algorithm, the existence of noncomputable functions, the basics of set theory to cardinality and the uncountability of the real numbers.

**MATH 482 Topics in Logic (also PHIL 432)** (II) \(MQR\)
Spring. 4 credits. Prerequisite: 1 logic course from the Mathematics Department at the 300 level or higher, or permission of the instructor. For description, see PHIL 432.

**MATH 483 Intensional Logic (also PHIL 436)** (II) \(MQR\)
Spring. 4 credits. Prerequisite: 1 logic course at the 200 level or higher from the Philosophy Department at the 300 level or higher, or permission of the instructor. For description, see PHIL 436.

**MATH 486 Applied Logic (also COM S 486)** (II) \(MQR\)
Spring. 4 credits. Prerequisites: MATH 221-222, 223-224, or 293-294; COM S 280 or equivalent (such as MATH 332, 336, 432, 434, or 481); and some additional course in mathematics or theoretical computer science. Course 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 490 Supervised Reading and Research**
Fall, spring. 1–6 credits. Supervised reading and research by arrangement with individual professors. Not for material currently available in regularly scheduled courses.

**MATH 505 Professional Level and Mathematics Education Courses**

[MATH 505 Educational Issues in Undergraduate Mathematics](#)
Spring. 4 credits. Prerequisite: graduate standing or permission of the instructor. Generally offered every two years. Not offered 2004–2005. This course examines various educational issues in undergraduate mathematics and the relationship of these issues to the mathematics itself. The precise choice of topics varies, but the intent is that a balance of different views be presented and discussed. There are extensive readings in the course and occasional guest lectures. Possible topics include nature of proof and how and when to teach it, calculus reform, teaching mathematics to schoolchildren, using writing, using history, alternative assessments, alternatives to lecturing, equity issues, effective uses of technology, what is mathematical understanding and how do we recognize it, what should every mathematics major know, and research in undergraduate mathematics.

[MATH 507 Teaching Secondary Mathematics: Theory and Practice](#)
Spring. 4 credits. Not offered 2004–2005. This course provides a direct experience of the foundations of the language of mathematics and the nature of proof. Possible additional topics: the mathematical definition of an algorithm, the existence of noncomputable functions, the basics of set theory to cardinality and the uncountability of the real numbers.

**MATH 508 Mathematics for Secondary School Teachers**
Fall and spring. 1–6 credits. Prerequisite: secondary school mathematics teacher, or permission of instructor. May not be taught every semester.

An 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/Courses/courses.html. This schedule 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 selecting meeting times.

**MATH 611-612 Real and Complex Analysis**
611, fall; 612, spring. 4 credits each. These are the core analysis courses in the mathematics graduate program. 611 covers measure and integration and functional analysis. 612 covers complex analysis, Fourier analysis, and distribution theory.

**MATH 613-614 Topics in Analysis**
613, fall; 614, spring. 4 credits each. For description, see PHIL 436.

**MATH 615 Mathematical Methods in Physics**
Fall. 4 credits. Intended for graduate students in physics or related fields who have a strong advanced calculus course and at least 2 years of general physics. A knowledge of the elements of finite dimensional vector space theory, complex variables, and some background in partial differential equations and Fourier series is assumed. Undergraduates are admitted only with permission of instructor. Topics are designed to give a working knowledge of the principal mathematical methods used in advanced physics. Course covers Hilbert space, generalized functions, Fourier transform, Sturm-Liouville problem in ODE, Green's functions, and asymptotic expansions.

**MATH 617 Dynamical Systems**
Fall. 4 credits. Generally offered every two years. Topics include existence and uniqueness theorems for ODEs; Poincare-Bendixon theorem and global properties of two-dimensional flows; limit sets, chain recurrence, pseudo-orbits and structural stability; linearization at equilibrium points; stable manifold theorem and the Hartman-Grobman theorem; and generic properties: transversality theorem and the Smale-Axiom A example. Examples include expanding maps and Anosov diffeomorphisms: hyperbolicity: the horseshoe and the Birkhoff-Smale theorem on transversal homoclinic orbits; rotation numbers; Herman's theorem; and characterization of structurally stable systems.

**MATH 618 Smooth Ergodic Theory**
Spring. 4 credits. Generally offered every two years. Topics include invariant measures; entropy; Hausdorff dimension and related concepts; hyperbolic invariant sets; stable manifolds, Markov partitions and symbolic dynamics; equilibrium measures of hyperbolic attractors; ergodic theorems; Pesin theory; stable manifolds of nonhyperbolic systems; Liapunov exponents; and relations between entropy, exponents, and dimensions.

[MATH 619-620 Partial Differential Equations](#)

**MATH 621 Measure Theory and Lebesgue Integration**
Fall. 4 credits. Course covers measure theory, integration, and Lp spaces.

**MATH 622 Applied Functional Analysis**
Spring. 4 credits. Not offered every year. Course covers basic theory of Hilbert and Banach spaces and operators on them. Applications.

**MATH 623 Complex Dynamical Systems**
Spring. 4 credits. Prerequisite: MATH 486. Not offered every year. Not offered 2004–2005. Various topics in the dynamics of analytic mappings in one complex variable, such as Julia and Fatou sets, the Mandelbrot set, Main-Sad-Sullivan's theorem on structural
stability. Also covers local theory, including reductive cycles and the Yozoc inequality, parabolic points and Ealee-Voronin invariants. Siegel disks and Yozoc's proof of the Siegel Brjuno theorem; quasiconformal mappings and surgery: Sullivan's theorem on nonwandering domains, polynomial-like mappings and renormalization, Shishikura's construction of Herman rings; puzzles, tableaux and local connectivity; problems; and Thurston's topological characterization of rational functions, the spider algorithm, and mating of polynomials.

MATH 631-632 Algebra
631, fall; 632, spring. 4 credits each.
These are the core algebra courses in the mathematics graduate program. MATH 631 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 632 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 633 Noncommutative Algebra
Spring. 4 credits.
Course covers Wedderburn structure theorem, Brauer group, and group cohomology.

MATH 634 Commutative Algebra
Course covers Dedekind domains, primary decomposition, Hilbert basis theorem, and local rings.

MATH 649 Lie Algebras
Spring. 4 credits. Generally offered every two years.
Topics include: nilpotent, solvable and reductive Lie algebras; enveloping algebras; root systems; Coxeter groups; and classification of simple algebras.

MATH 651 Introductory Algebraic Topology
Spring. 4 credits.
This is one of the core topology courses in the mathematics graduate program. It is 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 Poincare-Alexander and Steenrod axioms and on effective methods of calculation such as simplicial and cellular homology and Mayer-Vietoris sequences. If time permits, the homology ring of a space may be introduced.

MATH 652 Differentiable Manifolds I
Fall. 4 credits. Prerequisites: advanced calculus, linear algebra (MATH 431), point-set topology (MATH 453).
This is one of the core topology courses in the mathematics graduate program. It is an introduction to geometry and topology from a differentiable viewpoint, suitable for beginning graduate students. The objects of study are manifolds and differentiable maps. The collection of all tangent vectors to a manifold forms the tangent bundle, and a section of the tangent bundle is a vector field. Alternatively, vector fields can be viewed as first-order differential operators. We study flows of vector fields and prove the Frobenius integrability theorem. In the presence of a Riemannian metric, we develop the notions of parallel transport, curvature, and geodesics. We examine the tensor calculus and the exterior differential calculus and prove Stokes' theorem. If time permits we will give an introduction to de Rham cohomology, Morse theory, or other optional topics.

MATH 653 Differentiable Manifolds II
Spring. Prerequisites: MATH 652 or equivalent. Generally offered every 3-4 years.
Advanced topics from differential geometry and differentiable topology selected by instructor. Examples of eligible topics include transversality, foliations and bundle 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 654 Lie Algebras
Spring. 4 credits. Generally offered every two years.
Topics include: nilpotent, solvable and reductive Lie algebras; enveloping algebras; root systems; Coxeter groups; and classification of simple algebras.

MATH 656 Linear Algebra
Course topics include topological groups, Lie groups; relation between Lie groups and Lie algebras; exponential map, the Gauss Lemma and the conjugate and cut loci; parabolic points and Ecalle-Voronin invariants, transversality, cobordism, Morse theory, or other optional topics.

MATH 657 Algebraic Topology
Fall. 4 credits.
An 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 658 Riemannian Geometry
Spring. 4 credits. Generally offered every two years.
Course topics include: linear connections, Riemannian metrics and parallel translation; covariant differentiation and curvature tensors; the exponential map, the Gauss Lemma and completeness of the metric; isometries and space forms, Jacobs fields and the theorem of Cartan-Hadamard; the first and second variation formulas; the index form of Morse and the theorem of Bonnet-Myers; the Rauch, Hessian, and Laplacian comparison theorems; the Morse index theorem; the conjugate and cut loci; and submanifolds and the Second Fundamental Form.

MATH 671-672 Probability Theory
671, fall; 672, spring. 4 credits each.
Prerequisites: advanced calculus, linear algebra (MATH 431), point-set topology (MATH 453).
This is one of the core topology courses in the mathematics graduate program. It is an introduction to geometry and topology from a differentiable viewpoint, suitable for beginning graduate students. The objects of study are manifolds and differentiable maps. The collection of all tangent vectors to a manifold forms the tangent bundle, and a section of the tangent bundle is a vector field. Alternatively, vector fields can be viewed as first-order differential operators. We study flows of vector fields and prove the Frobenius integrability theorem. In the presence of a Riemannian metric, we develop the notions of parallel transport, curvature, and geodesics. We examine the tensor calculus and the exterior differential calculus and prove Stokes’ theorem. If time permits we will give an introduction to de Rham cohomology, Morse theory, or other optional topics.

MATH 674 Introduction to Mathematical Statistics
Spring. 4 credits.
Prerequisites: MATH 671 and OR/IE 670 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. Some statistical distances for probability measures are introduced, like Hellinger and total variation distance, and also the Kullback-Leibler relative entropy. The latter will be motivated by a discussion of source coding for information transmission. Asymptotic methods are introduced and developed in detail, with an emphasis on the concept of contiguity and its application to nonparametric hypothesis testing.

MATH 675 Statistical Theories Applicable to Genomics
Fall. 4 credits. Not offered 2004-2005.
This course focuses on statistical concepts useful in genomics (e.g., microarray data analysis) that involve a large number of populations. Topics include multiple testing and closed testing (the cornerstone of multiple testing), family-wise error rate, false discovery rate (FDR) of Benjamini and Hochberg, and Storey's papers relating to pFDR. We also discuss the shrinkage technique or the Empirical Bayes approach, equivalent to the BLUP in a random effect model, which is a powerful technique, taking advantage of a large number of populations. A related technique, which allows us to use the same data to select and make inferences for the selected populations (or genes), is discussed. If time permits, there may be some lectures about permutation tests, bootstrapping, and QTL identification.

MATH 681 Logic
Spring. 4 credits.
Course covers basic topics in mathematical logic, including propositional and predicate calculus; formal number theory and recursive functions; completeness and incompleteness theorems, compactness and Skolem-Lowenheim theorems. Other topics as time permits.

MATH 703 Topics in the History of Mathematics
Spring. 4 credits.
MEDIEVAL STUDIES

Undergraduate Study in Medieval Studies

Course work in medieval studies enhances the student’s enjoyment and understanding of the artistic and material relics of the Middle Ages: Gregorian chant, illuminated manuscripts and stained glass windows, Gothic cathedrals, Crusader castles, and picturesque towns cramped within ancient walls. Students discover the serious realities involved in, and shaped by, Arthurian tales of brave knights and fair 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 khanbalis, fear of demons and djinn, and the reassuring presence of angels. You can study this all and more very well in English, but see below for how to acquire the medieval languages that so enhance the experience.

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. It actually makes good sense to think out your positions on today’s world through study of the less complicated but intriguing medieval West, with whose successes and failures we must still contend. Serious investigation of exotic materials marks this concentration out as a unique addition to Cornell’s training. The Medieval Studies Program houses a lively undergraduate association, Quodlibet, that arrange frequent lectures on medieval topics and an annual celebratory Reading of prose and poetry in many medieval languages.

The “middle” in “Middle Ages” comes from its position between antiquity and the “modern” period, in a schema created for European and Western conditions. Our concentration, however, is more properly inclusive and treats serious investigation of exotic materials marks this concentration out as a unique addition to Cornell’s training. The Medieval Studies Program houses a lively undergraduate association, Quodlibet, that arrange frequent lectures on medieval topics and an annual celebratory Reading of prose and poetry in many medieval languages.

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Many students feel bound to choose their majors with an eye to future careers and earning potential. While this concentration provides strong interdisciplinary breadth to many majors (e.g., classics, all modern languages, history, music, philosophy), and is excellent preparation for graduate study in a medieval field, science majors do well too. The program provides encouragement,
guidance, and an avenue for intelligent appreciation of an important part of all our pasts.
Undergraduates who wish to undertake an independent major or concentration in Medieval Studies should consult the director of the program, 259 Goldwin Smith Hall, 255-8545, medievalst@cornell.edu.
The Undergraduate Concentration in Medieval Studies shall consist of five medieval courses (at the 200 level or above) in at least two different disciplines, of which up to two may also count toward the major, and one must come from our list of approved "core courses," which are marked with an asterisk (*).

### Medieval Languages

Medieval texts (like all others) become most original, and Cornell fortunately offers many languages. Students interested in a medieval language (Classical Latin for Medieval Latin) as background. Students interested in studying different aspects of the middle ages. It is especially intended to alert students to the prerequisites for various medieval languages.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Term</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*ENGL 311/611</td>
<td>Old English</td>
<td>4</td>
<td>Fall</td>
<td>E. Johannsson</td>
</tr>
<tr>
<td>*ENGL 319/619</td>
<td>Chaucer</td>
<td>4</td>
<td>Spring</td>
<td>A. Galloway</td>
</tr>
<tr>
<td>ENGL 274</td>
<td>Scottish Literature and Culture</td>
<td>3</td>
<td>Fall</td>
<td>C. Robinson</td>
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<tr>
<td>ENGL 321</td>
<td>Spenser and Malory (also RELST 319)</td>
<td>4</td>
<td>Spring</td>
<td>A. Galloway</td>
</tr>
<tr>
<td>ENGL 351</td>
<td>The Crusade Romances and the Project of Empire</td>
<td>4</td>
<td>Spring</td>
<td>S. Yeager</td>
</tr>
<tr>
<td>*ENGL 358</td>
<td>Icelandic Family Sagas</td>
<td>4</td>
<td>Spring</td>
<td>A. Galloway</td>
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<td>Spring</td>
<td>A. Galloway</td>
</tr>
<tr>
<td>ENGL 650</td>
<td>Latin Allegory and Vernacular Authority in the Middle Ages</td>
<td>4</td>
<td>Fall</td>
<td>M. Raskolnikov and W. Wetherbee</td>
</tr>
<tr>
<td>ENGL 616</td>
<td>Piers Plowman and the Problem of Literary History</td>
<td>4</td>
<td>Spring</td>
<td>A. Galloway</td>
</tr>
<tr>
<td>FRLIT 442/642</td>
<td>Sex in France</td>
<td>4</td>
<td>Spring</td>
<td>C. Howie</td>
</tr>
<tr>
<td>FRLIT 446/646</td>
<td>The Medieval Society of the Spectacle</td>
<td>4</td>
<td>Spring</td>
<td>C. Howie</td>
</tr>
<tr>
<td>*GERST 405-406</td>
<td>Introduction to Middle High German</td>
<td>4</td>
<td>Fall</td>
<td>A. Groos</td>
</tr>
<tr>
<td>*HIST 247</td>
<td>The Age of Cherlemagne</td>
<td>4</td>
<td>Spring</td>
<td>P. R. Hyams</td>
</tr>
<tr>
<td>RELST 239</td>
<td>History of China up to Modern Times (also ASIAN 293)</td>
<td>4</td>
<td>Fall</td>
<td>C. Peterson</td>
</tr>
<tr>
<td>RELST 251</td>
<td>Authority in the Later Middle Ages</td>
<td>2</td>
<td>Fall and spring</td>
<td>Staff.</td>
</tr>
</tbody>
</table>

### 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 contained in the catalog of the Graduate School available from the field coordinator, and at Cowcrofta, the school’s web site, www.arts.cornell.edu:medieval.

### Medieval Studies Courses: Graduate and Undergraduate

Courses in various aspects of medieval studies are offered every year in several cooperating departments, including Art History, Asian Studies, Classics, Comparative Literature, English, German Studies, History, Linguistics, Music, Near Eastern Studies, Philosophy, Romance Studies, Russian Literature, and by the Society for the Humanities. For descriptions, please see the home department. The current year’s offerings are:
The concentration has three tracks: European politics, economics, and society; modern European history, and European culture. The requirements for the concentration are:

1) Competence in at least one modern European language, Romance, Germanic, or Slavic (i.e., completion of a 300-level 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 three interdisciplinary core courses.

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 (400 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 concentration. Courses satisfying the breadth and distribution requirements in the College of Arts and Sciences, however, may be applied to the concentration. Students interested in completing a research project under the European Summer Research Program may apply for the Wood Fellowship in their junior year.

The Core Curriculum consists of courses:

- Electives: at least eight credits from the following course listings, and for further information consult the department office, 101 Lincoln Hall (telephone 255-4097, e-mail srt2@cornell.edu) and visit the web site at www.einaudi.cornell.edu/Europe.

of musical manuscripts and early printed books on music.

**Concert Halls.** The Department of Music sponsors more than 100 concerts annually. Cornell's principal concert halls are Bailey Hall Auditorium (capacity 900, currently under renovation), Sage Chapel (about 800), and Barnes Hall Auditorium (about 280).

**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 freshman seminars nor advanced placement credit count toward this requirement.

If one music course is counted for distribution, it must carry at least three credits, and it may not be in musical performance (MUSIC 321, 322, or 323) or in organizations and ensembles (MUSIC 331 through 436 and 421 through 448).

If two music courses are counted for distribution in LA, they must total at least six credits, and at least one of the courses must be academic, not performance-oriented. The second "course," however, may comprise either up to four credits earned in performance-oriented musical courses (MUSIC 322, 323-324) or up to four credits earned in organizations and ensembles (MUSIC 331 through 436 and 421 through 448), but not both.

**Facilities**

**Music Library.** The Sidney Cox Library of Music and Dance in Lincoln Hall has an excellent collection containing approximately 140,000 periodicals, books, scores, and parts; 60,000 sound and video recordings; and a microfilm collection of early printed and manuscript sources. Its depth and breadth serve the needs of a wide variety of users on the campus and its computer lab (designed specifically for music users), listening, and video viewing facilities are open to all members of the Cornell community. Highlights of the research collection include early opera libretti and scores, eighteenth- and nineteenth-century keyboard and chamber music, seventeenth- and eighteenth-century books on music, and an archive of American popular song from 1850 to 1950. In addition, the Carl A. Kroch Library houses, in the Division of Rare and Manuscript Collections, a collection of

This four-week course, given at the beginning of each term, fulfills the requirement of basic pitch, rhythm, and score-reading skills needed for some introductory courses and 200-level courses with prerequisites.

**MUSIC 101 Popular Music in America: A Historical Survey (also AM ST 105) (IV) (LA)**


**MUSIC 102 Fundamentals of Music (IV) (LA)**

Fall. 3 credits. No previous training in music required. M. Hatch.

An introduction to the theory of music from around the world: the structures of melody and rhythm (pulse, meter, scales, modes, texture, timbre, harmony, form) and the influences of audiences, music technologies (including instruments), reasons, and contexts for music making on instrumental and vocal music from classical, folk, traditional, and popular music of Asia, Africa, Europe, and the Americas. Extensive listening and video examples.

**MUSIC 103 Intro to World Music II: Asia and the Americas (also VISST 104) (IV) (CA)**

Fall. 3 credits. No previous training in music required. S. Pond.

Exploration of folk, popular, and traditional musical genres of the Western Hemisphere, particularly the African diaspora. The course examines both the elements of musical styles and the features of society that influence music. Listening assignments are major components of the course.

**MUSIC 104 Intro to World Music II: Asia (also VISST 104) (IV) (CA)**

Spring. 3 credits. No previous training in music required. M. Hatch.

An elementary, self-contained introduction to the theory of Western art music, emphasizing musical techniques, theoretical concepts, and their application. Intervals, scales, triads; basic concepts of tonality; extensive listening to music in various styles; analysis of representative works of Bach, Mozart, Beethoven, and Debussy.

**MUSIC 105 Introduction to Music Theory (IV) (LA)**

Spring or summer. 3 credits. Experience in reading music is recommended; students may take MUSIC 100 concurrently. J. Webster.

An elementary, self-contained introduction to the theory of Western art music, emphasizing musical techniques, theoretical concepts, and their application. Intervals, scales, triads; basic concepts of tonality; extensive listening to music in various styles; analysis of representative works of Bach, Mozart, Beethoven, and Debussy.

**MUSIC 106 Hildegard to Handel # (IV) (LA)**

Fall. 3 credits. Prerequisite: ability to read music or concurrent enrollment in MUSIC 100. Not offered 2004–2005. N. Zaslaw.

**MUSIC 108 Mozart to Minimalism # (IV) (LA)**

Spring. 3 credits. Prerequisite: ability to read music or concurrent enrollment in MUSIC 100. R. Harris-Warrick.

A survey of Western art music in many genres from the second half of the eighteenth century to the present. Composers whose music is studied include Haydn, Mozart, Beethoven, Schubert, Schumann, Mendelssohn, Berlioz, Chopin, Wagner, Verdi, Liszt, Brahms, Mahler, Debussy, Strauss, Stravinsky, Bartok, Ives, Webern, Messiaen, Copland, Bernstein, Stucky, and Sierra.
Music Theory

Students contemplating the music major are strongly advised to take MUSIC 151, 152, 153, and 154 in the freshman year; in any case MUSIC 152 and 154 must be completed no later than the end of the sophomore year.

MUSIC 151 Tonal Theory I (IV) (LA)
Fall. 3 credits. Prerequisites: admission by departmental placement exam and concurrent enrollment in or previous credit for MUSIC 153, or equivalent. Intended for students expecting to major in music and other qualified students. K. Taavola.

Detailed study of the fundamental elements of modal and tonal music: rhythm, scales, intervals, triads, modal principles and 2-part counterpoint; diatonic harmony and 4-part voice leading; basic formal structures. Study engages different repertoires, including Western art music as well as non-Western and popular traditions.

MUSIC 152 Tonal Theory II (IV) (LA)
Spring. 3 credits. Prerequisites: MUSIC 151 and 153 or equivalent, and concurrent enrollment in or previous credit for MUSIC 154. Intended for students expecting to major in music and other qualified students. L. B. or better in MUSIC 152 is required for admission to the music major. K. Taavola.

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 153 Musicianship I
Fall. 2 credits. Prerequisite: concurrent enrollment in or previous credit for MUSIC 151. Intended for students expecting to major in music and other qualified students. K. Taavola.


MUSIC 154 Musicianship II
Spring. 2 credits. Prerequisite: concurrent enrollment in or previous credit for MUSIC 152. Intended for students expecting to major in music and other qualified students. A grade of B- or better in MUSIC 154, and failure in none of the individual musicianship components of the course, are required for admission to the music major. K. Taavola.

Sight singing: longer melodies in 3 clefs, including diatonic modulation. Keyboard: diatonic chords and sequences. Dictation: intervals, rhythms; longer melodies; chorale phrases with diatonic modulation. Score reading: 3 parts using treble, alto, and bass clefs. Transcriptions of pop, jazz, and other genres.

MUSIC 251 Tonal Theory III (IV) (LA)
Fall. 3 credits. Prerequisites: MUSIC 152 and 154 or equivalent, and concurrent enrollment in MUSIC 253. R. Sierra.

Continuation of diatonic and introduction to chromatic harmony; species counterpoint; composition in small forms.
MUSIC 262 Haydn and Mozart (IV) (LA)
Fall. 3 credits. Prerequisite: any 3-credit course in music or permission of instructor. Not offered 2004–2005. J. Webster.

MUSIC 263 Beethoven (IV) (LA)
Spring. 3 credits. Prerequisite: any 3-credit course in music or permission of instructor. Not offered 2004–2005. J. Webster.

MUSIC 264 Musical Romantics (IV) (LA)
Spring. 3 credits. Prerequisite: ability to read music or concurrent enrollment in MUSIC 100. D. Rosen.
The course will be divided into four or five segments. The (tentative) topics for spring 2005 include: Franz Schubert, Paris between Revolutions (1830–1848), Giuseppe Verdi, and fin-de-siècle Vienna.

MUSIC 270 Sophomore Seminar: Music in American Cultures
Spring. 4 credits. Limited to 15 students. S. Pond.
This literature and writing-based course explores the historical experiences of various ethnic groups in the United States, and how these groups have contributed to the richness of American music. Course material is organized around themes that explore how issues of identity and ethnicity are expressed through music. While the course introduces students to basic concepts and terminology—both practical and analytical—used in the field of ethnomusicology, students will be encouraged to discover, comment on, and extend these tools. By doing secondary and primary research, and by incorporating fieldwork and a writing-based study, students will develop a portfolio of writing projects with the aim of publishing them. "Writing projects" is flexibly defined, as the expressive output will take several forms, including web-based projects.
This is a special seminar sponsored by the John S. Knight Institutes Sophomore Seminars Program. Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at engaging students into the disciplinary outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

MUSIC 274 Opera (also THETR 273) (IV) (LA)
Fall. 3 credits. A. Groos.
An introduction to opera through the examination of six or seven major works of the operatic repertory by such composers as Handel, Mozart, Verdi, Offenbach, Wagner, Puccini, and Britten, with attention to the interaction of the words, music, and visual elements. We will compare some of the different productions available on video and DVD recordings and in live performances.

MUSIC 275 Choral Sounds (IV) (LA)
Spring. 3 credits. Prerequisite: ability to read music or concurrent enrollment in MUSIC 100. Not offered 2004–2005. R. Harris-Warrick.

MUSIC 276 The Orchestra and Its Music (IV) (LA)
Spring. 3 credits. Prerequisite: any 3-credit music course or permission of instructor. N. Zaslav.

Music History Courses for Majors and Qualified Nonmajors

MUSIC 207 Survey of Western Music I (IV) (LA)
Fall. 3 credits. Prerequisite: MUSIC 151/153, concurrent enrollment in 151/153, 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 non-majors.

MUSIC 208 Survey of Western Music II (IV) (LA)
Fall. 3 credits. Prerequisite: MUSIC 152/154, concurrent enrollment in 152/154, or permission of instructor. U. Leisinger.
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 twentieth century. The course, which emphasizes listening and comprehension of genres and styles, is intended for music majors and qualified non-majors.

MUSIC 300 Proseminar in Musicology (IV) (LA)
Spring. 4 credits. N. Zaslav.
Introduction to methods in musicology, including historiography, criticism, approaches to vernacular and non-western music, and gender studies.

MUSIC 374 Opera and Culture (also GERST 374 and ITALA 374) (IV) (LA)
Spring. 4 credits. Prerequisite: any 3-credit music course or proficiency in German or Italian. A. Groos.
For description, see GERST 374.

MUSIC 381 Topics in Western Art Music to 1750 (IV)
Fall. 4 credits. Prerequisite: MUSIC 152 or permission of instructor. Not offered 2004–2005. Staff.

MUSIC 383 Topics in Western Art Music 1750 to the Present (IV)
Spring. 4 credits. Prerequisite: MUSIC 152/154 or permission of instructor. S. Pond.
This course addresses alternating topics, centering on the post-WW II years to ca. 1970. Even-numbered years: Rhythm-and-blues to funk. Using the change in Billboard classification from “race” records to “rhythm-and-blues" as a beginning point, we examine musical, commercial, and sociopolitical developments in black popular music to the advent of funk. Odd-numbered years: Post-bop jazz. Using the "bebop revolution" as a beginning point, we examine style movements (including cubop, cool and West Coast jazz, avant-garde jazz, modalism, and fusion) in light of changing aesthetics, sociopolitical movements, and intersections with other musics of the time. For either topic, reading (historical, biographical, and critical) and listening assignments are major components of the course. There are no midterm or final exams; however, quizzes and research papers are required.

MUSIC 387 Korean Music in a Global Context (also ASIAN 330)
Fall. 3 credits. J. H. Kim.
For description, see ASIAN 330.

MUSIC 398-399 Independent Study in Music History
398. Fall, 399. spring. 4 credits.
Prerequisite: MUSIC 152 and permission of instructor. Staff.
Advanced study of various topics in music history. Students enrolling in MUSIC 398–399 participate in. But do not register for, an approved 200-level music history course and, in addition, pursue independent research and writing projects.

MUSIC 400 Senior Seminar
Fall. 4 credits. K. Taavola.
Topic: Music in Fin-de-Siècle Paris. This course engages the rich cultural environment of Paris during the years 1889–1919 and its legacy into the twentieth century. The course investigates the many faces of Modernism—including Orientalism, Primitivism, Cubism, Dadaism, and the rise of technology, to name a few. We will consider the musical works of Debussy, Satie, Ravel, Les Six, Stravinsky, and composers associated with the French Concorde alongside contemporary films and ballets, as well as the commodity of the era, the growing presence of world folk traditions in Paris, and the emergence of jazz.

MUSIC 407 Early Dance (also DANCE 313)
Fall. 1 credit. R. Harris-Warrick.
Topic for fall 2004: Baroque Dance. This course introduces students to the basic movement vocabulary of dances from Western Europe during the Renaissance and Baroque periods. 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. Semesters that focus on Renaissance dance will include dances such as the pavane, galliard, branles, allemande, balli, and canarie from France.
This course uses selected commercially available technological resources to produce live music. The student is expected to master the Macintosh computer, several music software programs, and several synthesizers using MIDI. The ability to read music is helpful but not necessary. There are no papers to write; homework is presented in three classroom concerts. The final is a live presentation of the student's final project in a concert open to the public.

MUSIC 165 Computing in the Arts (also COM S 165) (IV) (LA)
Fall. 3 credits. G. Bailey
For description, see COM S 165.

MUSIC 320 Scoring the Moving Image Using Digital Technology (IV) (LA)
Spring. 4 credits. Prerequisite: MUSIC 120 with a grade of B or higher and MUSIC 251. D. Borden.
Students learn sound design and music composition using MIDI and Digital Audio to enhance images in motion. The course is at least partially collaborative, involving students taking courses in computer animation, film, and dance. In addition, to learn techniques involving synchronizing sound to image, film clips from various sources are used as practice exercises. The final project is a public showing of film computer animation and/or dance performance using the sounds and music provided by the students in this course.

MUSIC 355 Sound Design and Digital Audio (also THETR 368) (IV) (LA)
Fall. 4 credits. W. Cross.
For description, see THETR 368.

MUSIC 356 Digital Performance (also THETR 369) (IV) (IV) (LA)
Spring. 4 credits. W. Cross.
For description, see THETR 369.

MUSIC 494 Love, Sex, and Song in Medieval France (also FGSS 403) (IV) (CA)

MUSIC 395 Sondheim and Musical Theatre (also ENGL 473, THETR 472) (IV) (LA)
Fall. 4 credits. S. McMillin.
For prerequisite and description, see ENGL 473.

Independent Study

MUSIC 301-302 Independent Study in Music
301, fall; 302, spring. Credit TBA.
Prerequisite: departmental approval.
Presupposes experience in the proposed area of study. Staff.

Honors Program

MUSIC 401-402 Honors in Music
401, fall; 402, spring. 8 credits per year.
Limited to honors candidates in their senior year. Staff.

Digital Music and New Media

MUSIC 120 Learning Music through Digital Technology (IV) (LA)
Fall. 3 credits. Enrollment limited.
Prerequisite: permission of instructor. D. Borden.

Other colleges or universities) may be used to satisfy this requirement.

Fees. The fee for a one-hour lesson (or two half-hour lessons) weekly, with or without credit, is $420 per term. For a one-half hour lesson weekly (without credit only), the fee is $210. 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 322–323, Secs 9 and 10, and contact the Music Department office.

Scholarships. Music majors receive a scholarship of up to $420 per term. Members of department-sponsored ensembles may, with the permission of the director of the ensemble, receive one scholarship to help defray the costs 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 321-322-323 Individual Instruction
Prerequisite: advanced students only may register after a successful audition with the instructor, or, in the case of those who wish to take only a half-hour lesson per week or cannot receive credit for lessons, must enroll in MUSIC 321. The only grade option for 0-credit lessons is S-U.

MUSIC 322 Fall or spring. 2 credits each term. 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 321. The only grade option for 0-credit lessons is S-U.

MUSIC 323 Fall or spring. 4 credits each term. See section listing below for instructors.
Students earn 2 credits each term for a one-hour lesson (or two half-hour lessons) per week, accompanied by an appropriate practice schedule.

MUSIC 324 Fall or spring. 4 credits each term. See section listing below for instructors. Open only to junior and seniors majoring in music and to graduate students in music.

The section numbers listed below apply to MUSIC 321, 322, or 323, depending on the instrument studied.

Sec 01 Voice. J. Kellock.
Sec 02 Organ. T. Olsen.
Sec 03 Piano. X. Bjerken and M. Bilson.
Sec 05 Violin or Viola. K. Tan.
Sec 06 Cello. Staff.
Sec 07 Bass. Staff.
Sec 08 Winds. Staff.
Sec 09/Sec 10 Individual Instruction Outside Cornell.
All the standard orchestral and band instruments, keyboard instruments, guitar, and voice may be studied under certain conditions, be studied with private teachers. This course is available primarily for the study of instruments not taught at Cornell and when there is limited enrollment in MUSIC 321 and 322. Prior approval and audition by a member of the faculty in the department is required, and credit may be earned only as described under "Earning academic credit for lessons." Above. Additionally, a departmental petition must be completed by the end of the third week of classes. For information and a list of approved teachers, consider the department office. 101 Lincoln Hall.

Musical Organizations and Ensembles

Students may participate in musical organizations and ensembles throughout the year. Permission of the instructor is required, and admission is by audition only (usually at the beginning of each semester), except that the Sage Chapel Choir and the Cornell Gamelan Ensemble are open to all students without prior audition. Registration is permitted in both of these courses simultaneously and students may register in successive years, but no student may earn more than eight credits in these courses. Membership in these musical organizations and ensembles is also open to qualified students who wish to participate without earning credit.

MUSIC 331-332 Sage Chapel Choir
331, fall or summer; 332, spring, 1 credit each term. No audition for admission. R. Riley.
Open to all students and members of the university. Varied and demanding repertoire. The Sage Chapel Choir sings regularly in the Sunday Service of Worship, which is broadcast on 870 WHCU-AM radio, and on special occasions throughout the year.

MUSIC 333-334 Chorus
333, fall; 334, spring, 1 credit each term. Prerequisite: successful audition. S. Tucker. A treble-voice chorus specializing in music for women's voices and in mixed-voice repertoire.

MUSIC 335-336 Glee Club
335, fall; 336, spring, 1 credit each term. Prerequisite: successful audition. S. Tucker. A male-voice chorus specializing in music for men's voices and in mixed-voice repertoire.

MUSIC 337 Wind Symphony
Fall, 1 credit each term. Prerequisite: successful audition. C. Johnston Turner.

MUSIC 338 Symphonic Band
Fall and spring, 1 credit each term. Prerequisite: successful audition. C. Johnston Turner and J. Miller.

MUSIC 339-340 Jazz Ensemble II
339, fall; 340, spring, 1 credit each term. Prerequisite: successful audition. P. Merrill. Study and performance of classic and contemporary big band literature. Rehearsal once a week with 1-2 performances a semester.

MUSIC 342 Wind Ensemble
Fall and spring, 1 credit each term. Prerequisite: successful audition. C. Johnston Turner.

MUSIC 343-344 Symphony Orchestra
343, fall; 344, spring, 1 credit each term. Prerequisite: successful audition. C. Kim.

MUSIC 345-346 Introduction to the Gamelan
345, fall; 346, spring, 1 credit each term. Enrollment limited. Prerequisite: permission of instructor. M. Hatch. Concentrated instruction for students in advanced techniques of performance on the Indonesian gamelan.

MUSIC 347-348 World Music Choir
Fall and spring, 1 credit. 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 421-422 Chamber Orchestra
421, fall; 422, spring, 1 credit each term. Prerequisite: successful audition. C. Kim. Study and performance of chamber orchestra works with a broad repertoire from Mozart to premières of contemporary works.

MUSIC 423-424 Jazz Combos
423, fall; 424, spring, 1 credit each term. Prerequisite: successful audition. P. Merrill. Study and performance of classic and contemporary small-group jazz.

MUSIC 431-432 Middle Eastern Music Ensemble (also NES 447-448)
431, fall; 432, spring, 1 credit each term. Prerequisite: permission of instructor. M. Hatch. Performance of diverse musical traditions from the Middle East. Instruction in individual instruments (oud, ney, kanoun, and percussion) and group rehearsals, culminating in one or two performances per semester. Songs will be taught in several languages, with the assistance of local language and diction teachers.

MUSIC 433-434 Steel Band
433, fall; 434, spring, 1 credit each term. Prerequisite: permission of instructor. J. Armstrong. This performance group specializes in traditional Caribbean steel drum repertoire and beyond. Background in music is required.

MUSIC 435-436 World Drummimg Group
435, fall; 436, spring, 1 credit each term. Prerequisite: permission of instructor. J. Armstrong. This group specializes in traditional music from West Africa and the Caribbean. Drumming techniques, song, and dance styles are incorporated into each semester's activities. No previous percussion experience is necessary.

MUSIC 437-438 Chamber Winds
437, fall; 438, spring, 1 credit each term. Prerequisites: enrollment in Symphonic Band, Wind Symphony, or Wind Ensemble in the same semester as this course AND permission of instructor only. Coordinator: C. Johnston Turner. Flexible instrumentation ensembles perform original woodwind, brass, and percussion music from Gabrieli brass choirs and Mozart serenades through more contemporary works such as Stravinsky's Octet and new music premieres. The ensembles participate in Wind Symphony, Symphonic Band, and Wind Ensemble concerts in addition to several chamber concerts throughout the year.

MUSIC 439-440 Jazz Ensemble I
439, fall; 440, spring, 1 credit each term. Prerequisite: successful audition. P. Merrill. Study and performance of classic and contemporary big band literature. Rehearsals twice a week with 2-4 performances a semester.

MUSIC 441-442 Chamber Music Ensembles
441, fall; 442, spring, 1 credit each term. Prerequisite: successful audition. Coordinator: K. Tan. Study and performance of chamber music works from da Capo to octets, for pianists, string, and wind players. Small jazz ensembles may also enroll under this course number.

MUSIC 443-444 Chorale
443, fall; 444, spring, 1 credit each term. Prerequisite: successful audition. J. Miller. Study and performance of selected choral music for mixed voices.

MUSIC 445-446 Gamelan Ensemble
445, fall; 446, spring, 1 credit each term. Enrollment limited. Prerequisite: permission of instructor. M. Hatch. Advanced performance on the Javanese gamelan. Tape recordings of gamelan and elementary number notation are provided. Some instruction by Indonesian musicians is offered in most years.

MUSIC 447-448 Chamber Singers
447, fall; 448, spring, 1 credit each term. Prerequisite: successful audition. I. Leisinger. A mixed-voice chamber choir specializing in Renaissance and twentieth-century music.

Graduate Courses

Open to qualified undergraduates with permission of instructor.

MUSIC 601 Introduction to Bibliography and Research
Fall, 4 credits. L. Coral. 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 602 Analytical Technique (also SCHE 645)

MUSIC 603 Editorial Practice
Spring, 4 credits. U. Leisinger. Constitution and representation of musical texts. From the sources to "the" musical text: essential techniques of source study (description, transcription, and filiation). From the musical text to a printed edition: the editorial practice (peculiarities of music notation; critical commentaries; the process of editing and proofreading; computers and editing music). Opportunity to make a critical edition based on original sources (main repertoire: vocal music of the Bach family).

MUSIC 604 Introduction to Ethnomusicology
Spring, 4 credits. Also open to graduate students in anthropology, linguistics, psychology, sociology, Africana, Asian Studies, and other cognate fields with permission of instructor. S. Pond or M. Hatch.

This course surveys a spectrum of issues central to the field, including but not limited
to issues of identity and representation, methods of musical and cultural analysis, area studies, applied ethnomusicology, and intersections with other fields in the humanities and social sciences.

[MUSIC 622] Historical Performance Practice
The study of eighteenth- and nineteenth-century instrumental performance practices, with special emphasis on the string quartets of Haydn and the piano trios of Schubert. Open to qualified performers.

[MUSIC 653] Topics in Tonal Theory and Analysis

[MUSIC 654] Topics in Post-Tonal Theory and Analysis
Spring. 4 credits. K. Taavola.
Topic: French compositional practice from Berlioz to Messiaen.

[MUSIC 656] Advanced Orchestral Technique

[MUSIC 657/658] Composition
657, fall; 658, spring. 4 credits each term. R. Sierra, S. Stucky.

[MUSIC 659] Composing with Computer Software and Electronic Instruments

[MUSIC 674] German Opera (also GERST 672)
See GERST 672 for description.

[MUSIC 677] Mozart: His Life, Works, and Times (also GERST 757)

[MUSIC 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 with permission of instructor. Not offered 2004–2005. S. Pond.

[MUSIC 681] Seminar in Medieval Music
Fall. 4 credits. J. Peraino.
Topic: Machaut.

[MUSIC 683] Music and Postmodern Critical Theory

[MUSIC 684] Seminar in Renaissance Music

[MUSIC 686] Seminar in Baroque Music
Fall. 4 credits. R. Harris-Warrick
Topic: musical culture in mid-eighteenth-century Europe.

[MUSIC 688] Seminar in Classical Music

[MUSIC 689] Seminar in Music of the Romantic Era
Fall. 4 credits. U. Leisinger.
Topic: 19th to early 20th-century Lied.

[MUSIC 690] Seminar in Music of the Twentieth Century

[MUSIC 691/692] Historical Performance
691, fall; 692, spring. 4 credits each term.
Prerequisite: permission of instructor. M. Bilson.
Lessons on the major instrument with supplementary study and research on related subjects.

[MUSIC 693] Seminar in Performance Practice

[MUSIC 697/698] Independent Study and Research
697, fall; 698, spring. Credit by TBA. Staff.

[MUSIC 785] History of Music Theory

[MUSIC 787] History and Criticism

[MUSIC 901/902] Thesis Research
901. fall; 902, spring. Up to 6 credits each term, TBA. Offered for S-U only. Limited to doctoral students in music who have passed the Admission-to-Candidacy Exam.

NEAR EASTERN STUDIES
Joint faculty: M. Bernal (Emeritus), J. Zorn.

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.

Distribution Requirements
Any two Near Eastern Studies History or archaeology courses at the 200, 300, or 400 level that form a reasonable sequence or combination satisfy the distribution requirement. Any two Near Eastern Studies civilization or literature courses at the 200, 300, or 400 level that form a reasonable sequence or combination satisfy the distribution requirement in the humanities. NES 197 or NES 251 plus any other Near Eastern studies course will constitute a sequence to fulfill the distribution requirement in either social sciences/history or humanities, depending on the subject course used in combination with 197 or 251. All 200- or 300-level language courses may fulfill the humanities requirement.

The Major
The precise sequence and combination of courses chosen to fulfill the major is selected in consultation with the student's adviser. All majors must satisfy the following requirements (no course may be used to satisfy two requirements; S-U options not permitted):

A. Qualification in two Near Eastern languages or proficiency in one.
B. Nine three- or four-credit NES courses, which must include the following:
1) NES 197 or 251.
2) Two 200-level NES survey courses, one whose chronological parameters fall within the period 3000 B.C.E to 600 C.E., and one whose chronological parameters fall within the period 600 C.E. to the present. The following are examples (a complete list can be obtained in the department office):
3000 B.C.E to 600 C.E.
   NES 223, Introduction to the Hebrew Bible
   NES 261, Ancient Seafarers
   NES 229, Introduction to the New Testament
   NES 295, Introduction to Christian History
   600 C.E. to the present
   NES 235, Jews and Arabs in Contact and Conflict: The Modern Period
   NES 250, Muhammad and Mystics in the Literatures of the Islamic World
   NES 258, Islamic History 1258–1914
   NES 294, Modern History of the Near East
3) At least two NES courses at the 300 level or above (one of which may be NES 301, 302, 311, or 312).

Prospective majors should discuss their plans with the director of undergraduate studies before formally enrolling in the department. To qualify as a major, a cumulative grade average of C or better is required.

Honors. Candidates for the degree of Bachelor of Arts with honors in Near Eastern Studies must fulfill the requirements of the appropriate major study and enroll in the honors course, NES 499, in the fall and spring semesters of their senior year. For admission to the honors program, candidates must have a cumulative average of B+ or better and have demonstrated superior performance overall in Near Eastern Studies courses. After consulting their major adviser, candidates should submit an outline of their proposed honors work to the department during the second semester of their junior year. The Near Eastern Studies main office has more specific guidelines for the honors thesis.
Study abroad. Near Eastern Studies majors may choose to study in the Near East during their junior year. There are various academic programs in the countries of the Near East that are recognized by the Department of Near Eastern Studies and that allow for the transfer of credit. Archaeological field work on Cornell-sponsored projects in the Near East may also qualify for course credit.

First-Year Writing Seminars
For descriptions, consult the John S. Knight Institute brochure for times, instructors, and descriptions.

Language Courses

Arabic

NES 111-112 Elementary Arabic I and II
111, fall; 112, spring. Enrollment limited to 18 in each session. 4 credits each term. NES 111 is prerequisite for 112, or permission of instructor. Letter grade recommended. NES 112 provides language proficiency qualification. M. Younes.

The course provides a thorough grounding in all language skills: listening, speaking, reading, and writing. It starts with spoken Arabic and 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 113-210 Intermediate Arabic I and II
113, fall; 210, spring. Enrollment limited to 18 students in each section. 4 credits each term. NES 210 @ provides language proficiency and Option 1. Prerequisites: NES 113, one year of Arabic or permission of instructor; for NES 210, 113 or permission of instructor. Letter grade recommended. M. Younes.

A sequel to NES 111-112. 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 133-134 Introduction to Qur’anic and Classical Arabic (also RELST 133-134)

This course is designed for students who are interested in reading the language of the Qur’an and Hadiths (Sayings of the Prophet) with accuracy and understanding. Authentic texts in the form of chapters from the Qur’an and Hadiths are presented and analyzed, and basic grammatical structures are discussed, explained, and practiced systematically. Interested students are encouraged to memorize excerpts from the texts. At the end of the two-semester sequence, the successful student has mastered a working vocabulary of over 1,000 words, correct pronunciation, and the most commonly used grammatical structures. In addition, the course provides the student with a firm foundation on which to build an advanced study of Classical Arabic.

NES 213 Classical Arabic Texts (also RELST 213) @ (IV) (LA)
Spring. 3 credits. Prerequisite: NES 210 or equivalent. Not offered 2004-2005.

This course will introduce students to different genres of literary Arabic. We read, translate, and discuss selected texts written in classical and modern standard Arabic. Review of morphology and grammar

NES 214 Qur’an and Commentary (also RELST 214) @ (IV) (LA)
Spring. 3 credits. Prerequisite for NES 214: NES 113-210.

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 311-312 Advanced Intermediate Arabic I and II @
311, fall; 312, spring. 4 credits each term. Limited to 15 students. Fulfills Option 1. Prerequisite for NES 311 is NES 210 or permission of instructor; prerequisite for NES 312 is NES 311 or permission of instructor. Letter grade recommended. M. Younes.

Students are introduced 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 416 Structure of the Arabic Language (also LING 416) (III) (KCM)
Spring. 4 credits. Limited to 15 students. Prerequisite: one year of Arabic or a linguistic background. Not offered 2004-2005.

The course consists of a brief history of Arabic and its place in the Semitic language family, the sociolinguistic situation in the Arab world (diglossia), Arabic phonology (sounds, emphasis, syllable structure, and related processes), morphology (verb forms and derivational patterns), and syntax (basic sentence structures, cases, and moods).

Greek

NES 121-122 Elementary Modern Greek I and II (also CLASS 197-198)
121, fall; 122, spring. 4 credits each term. Limited to 15 students. NES 122 provides language qualification. M. Hnaraki.

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.

NES 127-222 Intermediate Modern Greek I and II (also CLASS 199-298)
127, fall; 222, spring. 4 credits. Prerequisite: one year (two semesters) of elementary modern Greek. NES 222 provides language proficiency and Option 1. M. Hnaraki.

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.

Hebrew

NES 101-102 Elementary Modern Hebrew I and II (also JWST 101-102)
101, fall; 102, spring. 4 credits each term. Prerequisite for NES 102: 101 or permission of instructor. Enrollment limited to 18 students in each section. Letter grade recommended. NES 102 provides language qualification. S. Shoen.

Intended for beginners. This course 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 103-200 Intermediate Modern Hebrew I and II (also JWST 103-200)
103, fall; 200, spring. Enrollment limited to 18 students in each section. 4 credits each term. NES 200 provides language proficiency and Option 1. Prerequisites: for NES 103, 102 or permission of instructor; for NES 200, 103 or permission of instructor. Letter grade recommended. N. Scharf.

A sequel to NES 101-102. Continued development of reading, writing, grammar, oral comprehension, and speaking. The 200 course introduces Hebrew literature and Israeli culture through the use of texts and audiovisual materials.

NES 123-124 Introduction to Biblical Hebrew I and II (also JWST 123-124, RELST 123-124)
123, fall; 124, spring. 3 credits each term. NES 124 provides language qualification. Enrollment limited to 17 students. Not offered 2004-2005.

The course is intended to develop basic proficiency in reading the Hebrew Bible. The first semester emphasizes introductory grammar and vocabulary. The second semester focuses on reading selected passages in the Hebrew Bible, with further development of vocabulary and grammar.
While this course is mainly concerned with the Hebrew Bible in the Middle Ages, attention will be **constantly** paid to the Bible as a point of encounter and disencounter between religions: Judaism, Christianity, and (occasionally) Islam.

**Hindi-Urdu**

NES 105-106 **Elementary Hindi-Urdu (also HINDI 101-102)**

Fall, spring. 6 credits each term. Staff. For description, see HINDI 101-102.

NES 107 **Introduction to Urdu Script (also HINDI 125)**

Spring. 1 credit. Staff. For description, see ASIAN 125.

**Persian**

NES 115-116 **Elementary Persian I and II**

115, fall; 116, spring. 4 credits each term. Limited to 15 students. NES 115 satisfies language qualification. R. Daneshvar.

This course is 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 will be prepared to deepen their comprehension of Persian through literature and the media.

**Turkish**

NES 117-118 **Elementary Turkish I and II**

117, fall; 118, spring. 4 credits each term. Limited to 15 students. C. Tildizhan.

This course will give students who have a foundation in Hebrew an opportunity to develop proficiency in reading biblical prose. Students will read a wide variety of texts, gain a more sophisticated understanding of biblical grammar and syntax, and increase vocabulary.

**Ancient Near Eastern Languages**

**Akkadian**

NES 333-334 **Elementary Akkadian I and II (also NES 633-634)**

333, fall; 334, spring @ # (IV) (LA). 4 credits each term. Prerequisite for NES 334: 333 or permission of instructor. N. Hirsch.

An introduction to the Semitic language of the Akkadians and Babylonians of ancient Mesopotamia. Utilizing the inductive method, students are introduced to the grammar and the cuneiform writing system of Akkadian through the study of original texts from the Code of Hammurapi, the Descent of Ishtar, and the Annals of Sennacherib. Secondary 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. Knowledge of another Semitic language is helpful but not essential.

**Ugaritic**

[NES 335 Ugaritic I @ # (IV)]

Fall. 4 credits. Prerequisite: knowledge of Hebrew. Enrollment limited to 15 students. Not offered 2004-2005. Staff.

A panoply of Ugaritic materials is read during the course, including selections from ancient Ugaritic inscriptions, the biblical books of Ezra and Daniel, Qumran texts, and the Targumim. Emphasis is placed on the reading and interpretation of original texts from the Cornell collections and their use in the reconstruction of Mesopotamian history and culture in the third millennium B.C.E.

**Hieroglyphic Egyptian**

[NES 330-331 Hieroglyphic Egyptian I and II]

330 fall; 331 spring @ # (IV) (LA). 4 credits. Not offered 2004-2005. Staff.

**Sumerian**

[NES 361 Sumerian Language and Culture I (also JWST 361, ARKEO 361)]


A continuation of NES 360, the course focuses on a more intense introduction to Sumerian language and grammar with additional readings in literature and 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 B.C.E.

**Aramaic**

[NES 435 Aramaic I @ # (IV)]

Fall. 4 credits. Prerequisite: knowledge of Hebrew. Enrollment limited to 15 students. Not offered 2004-2005. Staff.

**Hieroglyphic Egyptian**

[NES 330-331 Hieroglyphic Egyptian I and II]

330 fall; 331 spring @ # (IV) (LA). 4 credits. Not offered 2004-2005. Staff.

**Sumerian**

[NES 361 Sumerian Language and Culture I (also JWST 361, ARKEO 361)]


A continuation of NES 360, the course focuses on a more intense introduction to Sumerian language and grammar with additional readings in literature and 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 B.C.E.

**Ugaritic**

[NES 335 Ugaritic I @ # (IV)]

Fall. 4 credits. Prerequisite: knowledge of Hebrew. Enrollment limited to 15 students. Not offered 2004-2005. Staff.

A continuation of NES 360, the course focuses on a more intense introduction to Sumerian language and grammar with additional readings in literature and 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 B.C.E.

**Hieroglyphic Egyptian**

[NES 330-331 Hieroglyphic Egyptian I and II]

330 fall; 331 spring @ # (IV) (LA). 4 credits. Not offered 2004-2005. Staff.

**Sumerian**

[NES 361 Sumerian Language and Culture I (also JWST 361, ARKEO 361)]


A continuation of NES 360, the course focuses on a more intense introduction to Sumerian language and grammar with additional readings in literature and 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 B.C.E.

**Ugaritic**

[NES 335 Ugaritic I @ # (IV)]

Fall. 4 credits. Prerequisite: knowledge of Hebrew. Enrollment limited to 15 students. Not offered 2004-2005. Staff.

A continuation of NES 360, the course focuses on a more intense introduction to Sumerian language and grammar with additional readings in literature and 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 B.C.E.

**Archaeology**

**The Bible and Ancient Near Eastern Civilization (also JWST 227, ARKEO 227, RELST 227) @ # (IV) (LA)**


The Hebrew Scriptures contain a wide array of literary forms, including historical works, prophetic texts, and wisdom literature. These works—compiled from an even wider assortment of text types (cosmologies, folk
An introduction to the language, literature, history, culture and archaeology of Syria-Mesopotamia in the fourth and third millennia B.C.E. The course focuses on Sumerian and Akkadian archaeology and investigated in the archaeological record in the fourth millennium until its disappearance around 2000 B.C.E. In addition, it will emphasize the parallel development of the Semitic peoples in Syria (Elamites) and upper Mesopotamia (Akkadians). A special feature of the course will be a basic introduction to the Sumerian language utilizing original cuneiform tablets in the collection of the Department of Near Eastern Studies.

NES 365 Ancient Iraq II: From the Beginning of the Second Millennium to the Conquest of Alexander the Great (also ARKEO 363 and JWST 363) @ # (III or IV) (HA)
Spring. 4 credits. Prerequisite: NES 361. D. I. Owen.
An introduction to the history, culture, literature, and archaeology of Syria-Mesopotamia from the emergence of the Babylonians around 2000 B.C.E. through the Persian period, which was brought to an end by the conquest of Alexander the Great in 331 B.C.E. The interrelationships between the various political entities during this long period the Amorites, Hittites, Hurrians, Syrians, and Elamites (Iranians) will be emphasized.

NES 366 The History and Archaeology of the Ancient Near East (also ARKEO 366, JWST 366) @ # (III or IV) (HA)
Fall. 4 credits. Prerequisite: ARKEO 100 or permission of instructor. Not offered 2004-2005. D. I. Owen.

Civilization

NES 197 Introduction to Near Eastern Civilization (also JWST 197 and RELST 197) @ # (IV) (CA)

NES 244 Introduction to Ancient Judaism (also JWST 244 and RELST 244) @ # (III or IV) (HA)
Fall. 3 credits. Not offered 2004-2005. Staff.
This course focuses on the development of Judaism as a religion and as a civilization in antiquity, with particular emphasis on its beliefs and practices. Topics discussed include the development of monotheism, the role of the community and the individual, sacrifice and prayer as modes of worship, holidays, Sabbath, circumcision, and dietary laws. Jewish civilization is placed within the context of ancient civilizations (Canaan, Egypt, Babylon, Persia, Greece, Rome). We also focus on the rise of Jewish sects (Pharisees, Sadducees, Essenes, Zealots, etc.) in late antiquity. Texts studied include selections from the Bible, the Apocrypha, the Dead Sea Scrolls, Josephus, and the Mishnah. All readings in English translation.

NES 251 Judaism, Christianity, and Islam (also JWST 251, RELST 251) @ # (IV) (HA)
For description, see NES 251 under Near Eastern History.

NES 255 Introduction to Islamic Civilization (also HIST 253, RELST 255) @ # (III or IV) (HA)
Spring. 3 credits. D. Powers.
We consider the major themes of Islamic civilization as they developed from the lifetime of Muhammad until the twentieth 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. This 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 as appropriate.

NES 262 Daily Life in the Biblical World (also ARKEO 262, JWST 262, and RELST 262)
The course surveys the daily 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 the political leaders and members of social elites, at the expense of the activities of average citizens. The focus of this class on ancient technologies will provide a broader spectrum, spanning all social classes. Material to be covered will include topics such as food production and processing, pottery production, metalurgy, glass making, cloth production and personal adornment, implements of war, medicine, leisure time (games and music), and others.

NES 266 Ancient Egyptian Civilization (also ARKEO 266 and JWST 266) @ # (III or IV) (HA)
Fall. 3 credits. G. Kadish.
The course surveys the history and culture of pharaonic Egypt from its prehistoric origins down to the conquest by Alexander the Great. 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; science and technology; and such cultural factors as religion, literature, writing, art, and architecture. Considerable use will be made of ancient texts in translation and slides. This is basically a lecture course, but there will be opportunity for questions and clarifications.

NES 281 Gender and Society in the Muslim Middle East (also RELST 281, FGSS 281) @ (III) (CA)

NES 291 Arab Society and Culture (III) (CA)
Fall. 3 credits. Enrollment limited to 25 students. Not offered 2004-2005. M. Younes.)
Addressing primarily developments since the Second Vatican Council (1962–1965), this course familiarizes students with some of the principal contemporary forms of Roman Catholic thought and practice. We begin by situating these developments against the backdrop of the transformations in Catholicism’s responses to modernity since the late sixteenth century. Our principal interest at this stage lies in examining how Catholic leaders sought to meet the challenges posed by modernity’s emphasis on individual rights and freedoms, religious and cultural pluralism, and the rise of modern sciences and feminisms. This prepares the ground for a more focused examination of the following topics: medical ethics; sexuality, marriage, and the family; social justice; evolution; biblical interpretation; sacraments; Catholic spirituality; Mary; and Catholic feminism. Our sources include, among others, social scientific analyses of official Church documents, and the writings of influential Catholic social activists (Dorothy Day and Mother Teresa), mystics (Thomas Merton), feminists (Rosemary Radford Ruether), and theologians (Hans Urs von Balthasar, Karl Rahner, and Pierre Teilhard de Chardin).

NES 339 Islamic Spain: Culture and Society (also JWST 339/639, COM L 334/639, RELST 334/639, SPANL 334/639, NES 639) @ # (IV) (CA)

Spring. 4 credits. R. Brann. This course examines the culture and society of al-Andalus (Islamic Spain) from 711, when Islam arrived in Iberia, until 1492 and the demise of Nasrid Granada. Through extensive discussion and analysis of Arabic, Latin, and Hebrew primary documents and literary texts of various genres (in translation), the course challenges ideological bases of conventional thinking regarding the social, political, and cultural identity of medieval “Spain.” Among other things, the class investigates the origins of lyric poetry, the relationships among the various confessional and ethnic communities in al-Andalus and the problems involved in Mozarabic Christian and Andalusí Jewish subcultural adaptations of Andalusi Arabo-Islamic culture. 

NES 351 Law, Society, and Culture in the Middle East, 1200–1500 (also NES 651, RELST 350, HIST 372/652) @ # (III) (HA)

Spring. 4 credits. Enrollment limited to 25 students. Not offered 2004–2005. D. Powers. After surveying the historical development of Islamic Law, the seminar focuses on the structure and function of the Islamic legal system in the twelfth, thirteenth, and fourteenth centuries, using legal documents, judicial opinions, and court cases (all in English translation) to elicit major themes and issues (e.g., the Marital regime, women and property, social hierarchies, law, and the public sphere.)

NES 357 Islamic Law and Society (also RELST 356) @ # (III) (CA)

Spring. 4 credits. Not offered 2004–2005. D. Powers. The Shari’ab, or sacred law of Islam, embodies the essentiality of God’s commands that regulate the life of every Muslim in all its aspects. The Shari’ab comprises on an equal basis ordinances regarding worship and ritual as well as political and, in Western terms, strictly legal rules. This course examines the relationship between the Shari’ab and the major social, economic, and political institutions. Constitutional topics discussed include the status of women, slaves, and non-Muslims; attitudes toward the economy and the arts; the significance of jihad (holy war); the nature of the Muslim city; and the relationship between the Islamic legal establishment and the government. Attention is given to the function of the Shari’ab in the modern world, with special reference to the problems and challenges of legal reform.

[NES 371 A Mediterranean Society, and Its Culture: The Jews and Judaism under Classical Islam (also JWST 371, RELST 371, COM L 371) @ # (IV) (HA)]


NES 389 Sociology of Sport (also JWST 389 and SOC 330) Spring. 4 credits. J. Sokol. Familiarizing students with a range of questions and challenges concerning the promotion of social justice, this course examines a variety of Catholic sources, sociopolitical arguments, and influential proponents of peace and justice drawn from different global contexts. Issues to be discussed will include political and economic freedoms; employment, poverty, and welfare; discrimination; the political use of violence and non-violence; and environmental stances relating to global sustainability, distributive justice, and respect for non-human species. We will critically analyze major encyclicals, papal teachings and bishop’s statements, as well as attend to the writings of social scientists and Catholic activists involved in grassroots movements.

NES 392 Divination Sciences in Antiquity (also ASIAN 392 and CLASS 392) @ (IV) (HA)

Fall. 4 credits. C. Minkowski. For description, see ASIAN 392.

NES 395 Israeli Society (also JWST 395 and SOC 390) @ (III) (SBA)

Spring. 4 credits. T. Sorek. The course introduces students to major themes in contemporary Israeli society, focusing on the following: the tension between the definition of Israel as a Jewish state and its aspiration to be democratic, the place of religion in politics, the effects of the long-term occupation of the West Bank and the Gaza Strip, the fragile status of the Arab Palestinian citizens of Israel, civil-military relations, intra-Jewish ethnic divides, and gender relations. The course emphasizes processes of the formation of collective identities in Israel and the interdependency of culture and politics. Requirements: students are expected to come to class fully prepared to participate in a discussion of the readings; three knowledge quizzes; a movie report; active participation in the course Web-site forum; a midterm paper; final exam.

NES 447-448 Middle Eastern Music Ensemble (also MUSIC 431-432) 447, fall; 448, spring. 1 credit each term. Permission of instructor. Enrollment limited to 40 students. M. Hatch and staff. Performance of diverse musical traditions from the Middle East. Instruction in percussion, oud, ney, and kanoun, among others.

NES 451 The Multicultural Alhambra (also ART H 411, S HUM 411, SPANL 411) Fall. 4 credits. C. Robinson. For description, see S HUM 411.

NES 471 Religion and Bioethics (also RELST 471) Spring. 4 credits. J. Schuld. Students in this course will explore a variety of issues that have been shaped by relatively recent developments in scientific technology and medical practice. Such developments confront our society with issues that are not strictly scientific or medical, but also ethical and, for many, religious. Entangled in most questions concerning health care there are certain beliefs or assumptions about at least some of the following: What does it mean to be fully human and what acts of respect does that require from individuals, professionals, and communities? What is "quality of life" defined and what place should this have in determining medical decisions? How do we understand and in what ways should we respond to the personal and social burdens of illness, suffering, and death? Scientific and medical advances also involve us in debates over public policy. What technological goals do we want to pursue as a society and what ethical limits, if any, should we impose on the means to such ends? What are our moral and/or religious responsibilities as citizens in a religiously and culturally pluralistic society? What medical care can our society provide and what care can it afford? This course is designed to involve students through their readings, class participation, and papers in both the personal and public dimensions of bioethics.


NES 681 Politics of Transnationalism (also GOVT 681) Spring. 4 credits. S. Tarrow. For description, see GOVT 681.

History

[NES 234 Muslims and Jews in Confluence and Conflict (also JWST 234 and RELST 234) @ # (IV) (HA)]

Fall. 3 credits. Not offered 2004–2005. R. Brann. This course examines the cultural and historical interaction between Arabs and Jews from the emergence of Islam in the seventh century through the classical age of Islam. It focuses on the periods of classical Islamic civilization and medieval Judaism under the
After we undertake a historical overview of the (Christian) Bible, and the Arabic Qur'an, texts, including the Hebrew Bible, the emergence of Judaism, Christianity, and Muslims came to define themselves and in which communities of Jews, Christians, and Muslims look upon him as the first. How can Jews consider Abraham the first Jew, of demonizing adherents of another tradition? Have you ever wondered how Jews, changing economic and political role of Jews in the West; the end of the "Golden Age" of the Middle Ages to the Modern Era. This course examines the history of European translation, including secular and synagogal sense of a Sephardic identity. The course will study the interaction of Jewish with Muslim and Christian cultures and the stable yet evolving sense of a Sephardic identity. The course will explore the historical and literary-critical frames for reading primary sources in translation, including secular and synagogal poetry, philosophy, and kaballah; biblical hermeneutics and exegesis, and polemics.

NES 245 From Medievalism to Modernity: The History of Jews in E. Modern Europe, 1492-1789 (also JWST 253, HIST 265) # (III) (HA)
Fall. 3 credits. Not offered 2004-2005.
V. Caron.
This course examines the history of European Jewry during the centuries of transition from the Middle Ages to the Modern Era. We examine the extent to which traditional Jewish life began to break down during this period and thus paved the way for the emergence of modern Jewry. Topics include the Spanish Expulsion of 1492, religious, intellectual, and socioeconomic dimensions of the Marrano dispersion, including Liturianic Kabballah and the messianic messianic vision of Shelah Zevi; the establishment of Jewish communities in the West; the end of the "Golden Age" of Polish Jewry and the rise of Hasidism, the changing economic and political role of Jews in the seventeenth and eighteenth centuries; and the impact of the Enlightenment.

NES 249 Islam: In Theory and Practice (also RELST 259) # (IV) (CA)
Fall. 3 credits. S. M. Toorawa.
Islam is practiced by over a billion people worldwide. What are its origins and its original precepts? How did the teachings of Islam spread and evolve, and how have these been lived, interpreted, incorporated, and challenged in the modern day? We look at the life of Muhammad, the Quran, Islamic law, theology, and mysticism, and modern Muslim responses to the challenges of modernity.

NES 261 Ancient Seafaring (also JWST 261, ARKEO 275) @ # (III) (HA)
Fall. 3 credits. Not offered 2004-2005.
D. I. Owen.
For description, see NES 263 under Near Eastern Archaeology.

NES 265 Jerusalem through the Ages (also JWST 256, ARKEO 266, RELST 266) @ # (III) (HA)
Fall. 3 credits. J. Zorn.
For description, see NES 266 under Archaeology.

NES 274 History of the Middle East: Nineteenth and Twentieth Centuries (also JWST 274 and HIST 278) @ (HA)
Spring. 3 credits. M. Campos.
This course surveys the history, politics, and society of the Middle East from World War I until the present day. We will think critically about the transformation of the Middle East from autonomous Islamic empires to colonized mandates to post-colonial states; the development of collective identities such as nationalism, pan-Arabism, and Islamism; the formation and mobilization of social classes and changing gender relations; the Middle East through the lens of the Cold War and subsequent American hegemony; revolution, war, and civil strife; and popular culture.

NES 290 History of Zionism and the Birth of Israel (also JWST 290, HIST 267) @ (III) (HA)
Spring. 3 credits. Not offered 2004-2005. V. Caron.
For description, see HIST 267.

NES 295 Introduction to Christian History (also JWST 295, RELST 295, HIST 299) @ (III or IV) (HA)
This course offers an introduction of Christianity from the apostle Paul through the seventeenth century, with an emphasis on the diversity of Christian traditions, beliefs, and practices. We explore the origins of Christianity within Judaism in the eastern Mediterranean world, the spread of Christianity, the development of ecclesiastical institutions, the rise and establishment of monasticism, and the various controversies that occupied the Church throughout its history. The course draws on primary literary sources (from biblical literature to council proceedings, monastic rules, sermons, theological treatises, and biographies) as well as Christian art, inscriptions, music, and manuscripts.

NES 296 Sophomore Seminar: Jesus in History, Tradition, and Cultural Imagination (also HIST 296, RELST 296) @ (III or IV) (CA)
Who was Jesus? How do we reconstruct Jesus in history? What did he teach? Believe? Why was he executed? Why was he his identity so vehemently contested throughout the early centuries (and beyond) of Christianity? How did non-Christians, especially Jews and Muslims, understand and imagine the figure of Jesus? How has the figure of Jesus come to be imagined and reimagined in music, art, and literature? These are the questions at the forefront of this course, which offers an interdisciplinary approach to the study of the figure of Jesus. Beginning with our earliest materials (canonical and non-canonical early Christian texts) we explore the historical figure of Jesus, his life, context, worldview, the reasons for his death, and so forth. Here we raise issues of historical methodology. The second phase of the course is the reconstruction of this historical Jesus to the Jesus Christ imagined by various Christians, Jews, and Muslims. Here we look closely at the chirstological controversies that occupied much of Christian history. In the third part of the course, we take art constructions and imaginings about Jesus even further to look at the Jesus of art, music, film, and literature.
The materials here are, of course, vast, but we select representatives from each of these fields that demonstrate the presence and use of the figure of Jesus in the cultural imagination.

This is a special seminar sponsored by the John S. Knight Institutes Sophomore Seminars Program seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the disciplines' outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

[NES 321 Heresy and Orthodoxy in Early Christianity (also RELST 321) @ (IV) (CA)]
In this course we explore the varieties of Christian thought and practice from the first through the fourth centuries. In its earliest centuries, Christianity consisted of a diverse range of movements, each of which was considered "heretical" by its opponents, one of which came to dominate all the others and so earned for itself the designation "orthodoxy." The "heresies" we study include Adoptionism, Marcionism, Gnosticism, Montanism, Arianism, and Donatism.

Consideration is also given to the ways in which charges of "heresy" intersected with competing views about women in the early Church, the relationship between Judaism and Christianity, the construction of authority, and the content, function, and sacredness of early Christian books.

[NES 351 Law, Society, and Culture in the Middle East, 1200–1500 (also NES 651, RELST 350, HIST 372/652) @ (III) (MA)]
In this course, we will explore the development of Islamic Law, the institution of Islamic society in the thirteenth, fourteenth, and fifteenth centuries, using legal documents, judicial opinions, and court cases (all in English translation) to elicit major themes and issues (e.g., the Marital regime, women and property, social hierarchies, law, and the public sphere).

[NES 359 "Romanesque" and "Early Gothic" Art and Architecture: Europe and the Mediterranean, 900–1150 (A.D.) (also ART H 355)]
For description, see ART H 355.

[NES 366 The History and Archaeology of the Ancient Near East (also ARKEO 366, JWST 365) @ (III) or (IV) (MA)]
Fall. 4 credits. Prerequisite: ARKEO 100 or permission of instructor. Not offered 2004–2005. D. J. Owen.
For description, see Near Eastern Archaeology.

[NES 385 Middle Eastern Cities: History, Society, and Culture (also JWST 385 and HIST 382) @ (IV) (HA)]
Fall. 4 credits. M. Campos.

This course examines the role of the city in the Middle East, the contours of urban life and the lived experiences of city-dwellers, the city as a microcosm of broader historical transformations. In particular, we will look at the city as a site of governance, social relations, economic transformations, and cultural change. We begin with a theoretical discussion of the urban form as well as the historical and contemporary debate over the "Islamic city," ranging from the city as a space and time, and from the Mughbir to the Mashriq, and from the rise of Islam to the modern day, guided by the following analytical themes: holy cities and sacred spaces; urban social institutions; imperial capitals and provincial towns; the rise of the port cities and the world-economy; minority spaces and urban heterogeneity; colonialism and the transformation of the urban form; "public space" and urban social movements; divided cities such as Beirut and Jerusalem; and narratives of the city. We will read a variety of historical, anthropological, travel, fictional, and primary texts.

[NES 387 Comparative Islamic Movements (also ANTHR 387) @ (III) (CA)]
The course analyzes the emergence of Islamic movements in Russia, the Caucuses, Central Asia, and the Middle East with particular attention to their ideologies, constituencies, and relations with the state, nationalism, culture, and society. We explore several major questions: To what extent is the emergence of these movements a response to the contemporary social and political issues? To what extent do these movements draw on the Koran and Hadith? To what extent are their programs and ideologies modern inventions? What are the similarities and differences between these movements cross-regionally? And what is the historical context and significance of these movements?

[NES 393 History of Jews and Christians in the Modern Middle East (also JWST 393) @ (III) (MA)]
This course examines Jewish and Christian communities in the modern Middle East (nineteenth and twentieth centuries) from a comparative historical perspective, focusing on the Arab Levant (Mashriq), Egypt, and the former Ottoman heartland of Anatolia and the Balkans. We examine diverse aspects of non-Muslim experience in the Middle East while analyzing these communities in dialogue with their surrounding Muslim states and societies. Thematically, we cover issues such as communal life, economy, gender, folk religion, social and spatial boundaries, nationalism, ethnic conflict, Diaspora, and reconstructions of the Jewish and Christian past as well as ongoing struggle in the contemporary Middle East. We draw on a wide variety of interdisciplinary primary and secondary sources, including oral histories, ethnography, films, memoirs, and scholarly texts.

[NES 397 History of the Israeli-Palestinian Conflict (also JWST 397, SOC 397 and GOVT 397) @ (III) (MA)]
Fall. 4 credits. T. Sorek.
This course introduces students to the complexity of the Israeli-Palestinian conflict in its various dimensions: national, religious, economic, and cultural. It outlines the history of the conflict from the beginning of Zionist immigration to Palestine in the late nineteenth century until the current day. The course juxtaposes the different political, philosophical, and ideological positions of the various actors involved and analyzes the sociopolitical process as a product of these interrelated positions. In addition, it demonstrates how the internal structures of each of these groups influence and are influenced by the dynamics of the conflict. Special emphasis is given to the significance of interdependency of culture and policies; national symbolism as both product of the conflict and an element that maintains it; the significance of hermetic victimhood and martyrdom in shaping the conflict and the identities of the parties involved.

Requirements: three knowledge quizzes, a midterm paper, a movie report, an active participation in the course web-site forum, and a final exam.

[NES 418 Seminar in Islamic History: 600–750 (also HIST 461-671, NES 618, RELST 418) @ (III) (HA)]
An examination of Islamic history from 600–750, with special attention to interpretive issues relating to the career of the Prophet Muhammad: the Arab conquests, the emergence of the Caliphat, conversion to Islam, and the Abbasid revolution. Students read primary sources in English translation, especially The History of Tabari.

[NES 453 Islamism (also GOVT 466) (III)]
For description, see GOVT 466.

[NES 651 Law, Society, and Culture in the Middle East, 1200–1500 (also NES 351, RELST 350, HIST 372/652)]
For description, see NES 351.

Literature

[NES 213 Classical Arabic Texts (also RELST 213) @ (IV) (LA)]
This course will introduce students to different genres of literary Arabic. We read, translate, and discuss selected texts written in classical and modern standard Arabic. Review of morphology and grammar.

[NES 214 Qur'an and Commentary (also RELST 214) @ (IV) (LA)]
Spring. 3 credits. Prerequisite: NES 134 or NES 210 or equivalent. 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 223 Introduction to the Bible (also JWST 223, RELST 223) @ (IV) (LA)]
Spring. 3 credits. P. Hamburger.
The goal of this course is to help students gain an understanding of the Hebrew Bible within its historical and cultural environment. We will study this compilation of texts from
ancient Israel with attention to the various literary genres also found in ancient Near Eastern literature, the historical circumstances associated with the texts, and recurring theological issues. In addition to studying the biblical texts and exploring major areas of modern biblical criticism, students will have the opportunity to handle some types of evidence that scholars use to reconstruct ancient Israelite religious history, including texts from various parts of the ancient Near East, an Israelite inscription, and other archaeological evidence.

[NES 229 Introduction to the New Testament (also RELST 229 and JWST 229) @ (IV) (HA)]
Fall. 3 credits. Not offered 2004-2005.
K. Haines-Eitzen.
This course provides a literary and historical introduction to the earliest Christian writings, most of which eventually came to be included in the New Testament. Through the lens of the gospel narratives and earliest Christian letters, especially those of Paul, the course explores the rich diversity of the early Christian movement, from its Jewish roots in first-century Palestine through its development and spread to Asia Minor and beyond. Careful consideration is given to the political, economic, social, cultural, and religious circumstances that gave rise to the Jesus movement, as well as those that facilitated the emergence of various manifestations of early Christian beliefs and practices. (Students who have had at least one year of Greek and would like to participate in a one-credit, New Testament Greek reading weekly seminar should also enroll in NES 329.)

[NES 235 Jews and Arabs in Contact and Conflict: The Modern Period (also JWST 235 and COM L 245) @ (III or IV) (CA)]
Fall. 3 credits. Not offered 2004-2005.
D. Starr.
This course traces the history and representations of Arab-Jewish relations from the late nineteenth century to the present. The majority of class time will be devoted to discussing films and films by Jews from Arab countries: Israelis from a variety of backgrounds; Palestinians, including Palestinians in Israel, under Israeli occupation, and in the Diaspora; and Arabs representing a variety of other nationalities. Primary source documents and critical studies provide the historical, cultural, and political frameworks for our discussions. Topics include Zionism, Arab nationalism, minority relations, establishment of the state of Israel, Palestinian dispersion, Arab-Israeli wars, terrorism, peace negotiations, establishment of the Palestinian Authority, post-Zionism, and normalization.

[NES 250 Muhammad and Mystics in the Literatures of the Islamic World (also RELST 254, COM L 250) @ (IV) (LA)]
S. Toorawa.
The life of the Prophet Muhammad and the teachings of Muslim mystics (sufis) have provided material and inspiration for numerous writers of the Islamic world. We use our readings, in English translation, of works in Arabic, Malay, Panjabi, Persian, Swahili, Turkish, and Urdu, to help us interrogate the ways in which Muhammad, mystics, and mysticism have shaped religion, literature, and society.

[NES 256 Introduction to the Quran (also COM L 256, RELST 256, JWST 256) @ (IV) (CA)]
S. M. Toorawa.
In 7th-century Arabia, a merchant by the name of Muhammad shared with his followers God's Word as revealed to him through the Angel Gabriel. This book is not only a source of spiritual guidance and law for over a billion people the world over. In this course, a literary, historical, and religious introduction to that book, the Quran, we explore the crosscurrents of the Quran's revelation; its written compilation; its narrative structure; its major themes; its connections to and departures from the Hebrew Bible and the New Testament; Quranic commentary, translation, and the problems associated with it; the impact of the Quran on political and religious thought; and the influence of the Quran on literature.

[NES 293 Sophomore Seminar: Middle Eastern Cinema (also JWST 291, FILM 293, COM L 293, and VISST 293) @ (IV) (LA)]
We frequently see representations of "Middle Easterners" in the American media, whether on the news, or in TV dramas and film. But there are far fewer opportunities to see how the media from the Middle East represent their own cultures. In this course we view films from the Arab world, including North Africa and the Eastern Mediterranean, as well as from Iran and Israel. The films range from musical comedies, to dramas, to experimental genres. Readings provide background on the particular cultural and historical contexts in which the films are produced and familiarize students with techniques for critically interpreting visual media. Films are screened on Mondays at 7:30 P.M. and also are available on reserve.
This is a special seminar sponsored by the John S. Knight Institutes Sophomore Seminars Program. Seminars offer discipline-specific study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the disciplines outlook, discourse community, modes of knowing, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and to personalized instruction with top university professors.

[NES 299 Hebrew Bible and Arabic Qur'an in Comparative Perspective (also RELST 299, COM L 299, JWST 299) @ (IV) (LA)]
K. Haines-Eitzen.
In this course, we read major examples of classical and medieval Arabic literature in translation. In addition to the *Thousand and One (or Arabian) Nights*, we explore works such as al-Jahiz's *Book of Stories*, Maymunat al-Hariri and al-Hamadhani, the Arabic biographical and autobiographical traditions, encyclopedic writing by al-Masudi, and the travel accounts of Ibn Battuta. We also complement our readings of early narrative with contemporary interventions, e.g. the works of Djebar, Kilti, and Wanni. We pay special attention to gender, tradition, satire, and irony.

[NES 319 Crime and Conflict in the Modern Arabic Novel (also COM L 319) @ (IV) (LA)]
Fall. 3 credits. Not offered 2004-2005.
S. M. Toorawa.
In this course we read seven modern Arabic novels in translation in which the themes of crime and conflict are uppermost, including Nobel Laureate Naguib Mahfouz's *The Thief and the Dogs*, Nawal El Saadawi's *Woman at Point Zero*, and Rachid El Dafî's *Dear Mister Karabata*. We complement the readings with three films.

[NES 320 Women in the Hebrew Bible (also JWST 320, RELST 316, and FGSS 328) @ (IV) (LA)]
This course features stories about women in the Hebrew Bible. Through literary readings of these texts, we attempt to understand the role of narrative in the promotion of ancient Israelite ideology. We ask such questions as why do women appear so prominently in the Bible's stories, and what do these women represent in the larger picture of ancient Israelite culture? We look at different literary types (e.g., foreign woman, prostitute, seductress, widow), and we discuss the social and historical reality behind the literary incorporation of women. All texts in English translation. In addition there is a one-credit option for reading the texts in Hebrew (NES 326).

[NES 322 Reinventing Biblical Narrative (also JWST 322, RELST 323) @ (IV) (HA)]
K. Haines-Eitzen.

[NES 329 Intro to the New Testament—Seminar (also JWST 329, RELST 329)]
Fall. 1 credit. Prerequisite: concurrent enrollment (or past enrollment) in NES 229 and 1 year of ancient Greek. Not offered 2004-2005. K. Haines-Eitzen.
A weekly seminar that may be taken in addition to NES 229. The seminar provides an opportunity to read portions of the New Testament and other early Christian writings in Greek. We work on grammatical and textual issues as well as other problems related to translations.

[NES 339 Islamic Spain: Culture and Society (also JWST 339, COM L 334, RELST 334, SPAN L 339/699) @ (IV) (CA)]
Spring. 4 credits. K. Haines-Eitzen.
For description, see NES 339. under Civilization.
This course examines literary representations of the vibrant Jewish communities of Egypt, from the Biblical narratives to the modern period. Through our readings from the rich textual record spanning millennia, we explore the shifting symbolism of the Exodus narrative as well as transformations in the understanding of "exile" and " diaspora."

Beginning with a discussion of the Biblical and Rabbinic representations of Pharaonic narrative as well as transformations in the Late Antique, and Medieval Islamic periods. We will spend proportionally more time discussing the representations of Jewish communities in Egypt in the nineteenth and twentieth centuries.

**NES 394 Gender, Sexuality, and the Body in Early Christianity (also RELST 394, FGSS 394, JWST 394) @ (IV) (CA)**


Beliefs about gender, sexuality, and the human body were remarkably interwoven with political, religious, and cultural disputes in early Christianity. In this course we explore the construction and representation of gender, sexuality, and the body in various forms of Christianity from the first century through the fourth. Asceticism and celibacy, veiling and unveiling, cross-dressing and Gnostic androgyny, marriage and childbirth, and homosexuality are among the topics considered, and our sources range from the New Testament, early Christian apocrypha, martyrologies, and patristic writings to Greek medical texts, Jewish midrash, Roman inscriptions, and Egyptian erotic and magical spells. Current interdisciplinary and theoretical studies on gender, ideology, sexuality, and power aid us in developing our analytical approaches to the ancient materials.

**NES 400 Seminar in Advanced Hebrew (also JWST 400) @ (IV) (LA)**

Fall. 4 credits. Prerequisite: NES 302/JWST 302 or permission of instructor. Enrollment limited to 15 students. The course may be repeated for credit with permission of instructor. Not offered 2004–2005. N. Scharf.

Continuation of work done in NES/JWST 302, with less emphasis on the study of grammar. We will read and discuss texts of cultural relevance, using articles published in Israeli newspapers and works by authors in each of the three principal genres: poetry, theater, and novels.

**NES 401 Topics in Modern Hebrew Literature @ (LA)**

Spring. 4 credits. Prerequisite: NES 302/JWST 302 or permission of instructor. Enrollment limited to 15 students. Not offered 2004–2005. D. Starr.

This course examines literary representations of the vibrant Jewish communities of Egypt, from the Biblical narratives to the modern period. Through our readings from the rich textual record spanning millennia, we explore the shifting symbolism of the Exodus narrative as well as transformations in the understanding of "exile" and " diaspora."

Beginning with a discussion of the Biblical and Rabbinic representations of Pharaonic narrative as well as transformations in the Late Antique, and Medieval Islamic periods. We will spend proportionally more time discussing the representations of Jewish communities in Egypt in the nineteenth and twentieth centuries.

**NES 409 Seasons of Migration (also JWST 409, RELST 409) @ (IV)**


**NES 414 Readings in Arabic Literature (IV) (LA)**

Fall and spring. 4 credits. Prerequisites: NES 312, a 400-level NES Arabic course, or permission of instructor. S. M. Toorawa.

This course will introduce students to Arabic prose literature through a close reading of selections by classical, medieval, and modern writers. Emphasis is on grammar and syntax.

**NES 415 Readings in the Modern Arabic Short Story @ (IV) (LA)**

Fall. 4 credits. Prerequisite: NES 312 or permission of instructor. Not offered 2004–2005. D. Starr.

This course introduces students to modern Arabic literature through the genre of the short story. Class discussions and writing assignments center on interpretation and textual analysis.

**NES 419 Readings in Arabic Poetry (IV) (LA)**

Fall. 4 credits. Prerequisite: NES 312, a 400-level NES Arabic course, or permission of instructor. Not offered 2004–2005. S. M. Toorawa.

This course introduces students to Arabic poetry through a close reading of selections by pre-Islamic, early medieval, and modern poets. Emphasis is on style.

**NES 420 Readings in Biblical Hebrew Prose (also JWST 420 and RELST 420) @ (IV) (LA)**

Fall. 4 credits. F. Hamori.

For description, see NES 420 under Hebrew.

**NES 421 Readings in Biblical Hebrew Poetry (also JWST 421, RELST 421) @ (IV) (LA)**

Spring. 4 credits. Prerequisite for NES 421 1 year of biblical or modern Hebrew. Course may be repeated for credit. Not offered 2004–2005. Staff.

Advanced course covering selected poems of the Hebrew Bible. Chapters studied include various Psalms, parts of the Book of Job, various prophetic speeches, and early compositions such as Genesis 49 and Judges 5. Emphasis is placed on the philological method, with attention to literary, historical, and comparative concerns as well.

**NES 423 Sacred Fictions (also JWST 423, RELST 411, COM L 411, CLASS 461, and S HUM 411)**


**NES 437 The Cross and the Crescent (also HIST 429, SPANL 446) @ (III) (CA)**


For description, see SPANL 446.

**NES 491–492 Independent Study, Undergraduate Level**

Fall and spring. Variable credit. Prerequisite: permission of instructor. Staff.

In the first half of the twentieth century the Mediterranean port city of Alexandria supported a multilingual, cosmopolitan culture. This course explores the discursive and theoretical potential offered by this unique cosmopolitan space-time, and the literary and artistic legacy it spawned. We discuss works by Aciman, Cavafy, Chahine, Durrell, al-Kharrat, and Tsalas, among others.

**NES 499 Independent Study, Honors**

Fall and spring. 8 credits. Prerequisite: permission of instructor. Staff.

**NES 614 New York, Paris, Baghdad: Poetry of the City (also NES 314, FRLIT 314/316, COM L 390/387)**

Spring. 4 credits. S. M. Toorawa.

For description, see NES 314.

**NES 615 1001 Nights and Other Arabic Writing (also NES 315)**


In this course, we read major examples of classical and medieval Arabic literature in translation. In addition to the Thousand and One (or Arabian) Nights, we explore works such as al-Jahiz's Book of Misers, the Maqamat of al-Hariri and al-Hamadhani, the Arabic biographical and autobiographical traditions, encyclopedic writing by al-Mus'udi, and the travel accounts of Ibn Battuta. We also complement our readings of early narrative with contemporary interventions, e.g., the work(s) of Dichter, Klibi, and Wannus. We pay special attention to gender, tradition, satire, and irony.

**NES 639 Islamic Spain: Culture and Society (also NES 339, JWST 339/369, COM L 334/369, RELST 334/369, SPAN L 339/369)**

Spring. 4 credits. R. Brunn.

This course examines the culture and society of al-Andalus (Islamic Spain) from 711, when Islam arrived in Iberia, until 1492 and the demise of Nasrid Granada. Through extensive discussion and analysis of Arabic, Latin, and Hebrew primary documents and literary texts of various genres (in translation), the course challenges ideological bases of conventional thinking regarding the social, political, and cultural identity of medieval "Spain." Among other things, the class investigates the origins of lyric poetry, the relationships among the various confessional and ethnic communities in al-Andalus and the problems involved in Mozarabic Christian and Andalusii Jewish subcultural adaptations of Andalusii Arabo-Islamic culture.

**NES 691–692 Independent Study: Graduate Level**

Fall and spring. Variable credit. Prerequisite: permission of instructor. Staff.

**Related Courses in Other Departments**

- Africana Studies
- Archaeology
- Asian Studies
- Classics
- Comparative Literature
- Economics
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 department of philosophy 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 211, or a course with a large component on Plato or Aristotle), at least one course on classical modern metaphysics and epistemology from Descartes through Cant, and a minimum of three courses numbered above 300. Students admitted to the major (after fall 1996) are required to take a minimum of six philosophy courses numbered above 200, and may not count more than one section of PHIL 100 toward the major. Courses numbered 191–199 do not count toward the major.

A course in formal logic (e.g., PHIL 231), while not required, is especially recommended for majors or prospective majors. Philosophy majors must also complete at least eight credit hours of coursework in related subjects approved by their major advisers. 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 philosophy. In either or both terms of the senior year a candidate for honors enroll in PHIL 490 and undertakes research leading to the writing of an honors essay. The honors essay is due at the end of the final term. Honors students normally need to take PHIL 490 both terms of their senior year to write a satisfactory honors essay. PHIL 490 does not count toward the eight philosophy courses required for the major. Prospective candidates should apply at the Philosophy Department office, 218 Goldwin Smith Hall.

**Fees**

In some courses there may be a small fee for photocopying materials to be handed out to students.

**Introductory Courses**

These courses have no prerequisites; all are open to freshmen.

**First-Year Writing Seminars in Philosophy**

Fall and spring. 3 credits. Consult the John S. Knight Institute brochure for times, instructors, and descriptions.

**PHIL 101 Introduction to Philosophy # (IV) (KCM)**

Fall, spring, and summer. 3 credits. Fall: T. Hinton; spring: B. Weatherson.

**Fall:** The aim of this course is to provide a general introduction to the study of philosophy. What can we know about the external world? Do you know for a fact that you're reading this course description right now? Couldn't you simply be having a very vivid dream in which you thought you were reading it? Then there is the question of whether or not we have free will. If you decide to take this course, will you have freely chosen to do so? Will your decision have been necessitated by, say, by your genetic makeup and your childhood experiences? Then there are questions in ethics. What makes actions right and wrong? Is it always right to make the most people happy? Or are there ways of treating other people that are, morally speaking, off limits? We will try to clarify these (and other) questions and we'll examine what some philosophers have said in the course of trying to answer them.

**Spring:** An introduction to several problems of philosophy, and to the techniques philosophers use for addressing them. How do you know you're not dreaming right now? Can computers think? Do we have any reason to believe in the existence of a god? What makes an action right or wrong? Are we ever responsible for anything we do? Is it possible to travel back in time?

**Summer:** 3 credits. 6-week session. An introduction to several central philosophical questions: Is there knowledge so certain that it can never be doubted? Do we have secure ground for our future expectations? What is the nature of the mind and how does it relate to matter? What is free will? What is the nature and basis of our moral obligations? Readings include major philosophers of the past as well as contemporary philosophers.

**PHIL 145 Contemporary Moral Issues (IV) (KCM)**


**PHIL 151 Philosophy of Sport (IV) (KCM)**


**PHIL 181 Introduction to the Philosophy of Science (IV) (KCM)**


**PHIL 191 Introduction to Cognitive Science (also COGST 101 and PSYCH 102) (III) (KCM)**

Fall. 3 or 4 credits. Majors only. For description, see Cognitive Studies.

**PHIL 193 Inequality, Diversity, and Justice (also CRP 293, GOVT 293, SOC 293) (KCM)**

Fall. 4 credits. No prerequisites. Intended primarily for freshmen and sophomores. One introductory lecture F or W 27; thereafter, lecture M W. Secs M W. Secs F. Miller.

An interdisciplinary discussion of the nature and moral significance of social inequality, diversity, poverty, and the search for just responses to them. How unequal are economic opportunities in the United States today? How many people are in genuine poverty? What are the typical causes of poverty? To what extent, if any, does justice require government action to reduce current economic inequalities? Does race have special significance as a source of inequality? Does gender? Is affirmative action justified, as a response to such inequalities? How does membership in an ethnic group shape people's lives, and how should it? How should governments deal with religious diversity and other differences in ultimate values (which give rise, for example, to radically different attitudes toward abortion, school prayer,
and sexuality? Do people in per-capita rich countries have a duty to help the foreign poor? Moral argument, investigations of social causes of reasoning interact in the search for answers to these questions. To provide these resources, the course is taught by leading faculty researchers in philosophy, political theory, the social sciences, and law.

**PHIL 194 Global Thinking (also GOVT 294) (III or IV)**
Fall. 4 credits. H. Shue.
The United States is the mightiest military power in human history. How should this power be used? We will examine the meaning and the importance of central considerations usually invoked, including: the national interest including national security, the international rule of law including the laws of war, the promotion of fundamental values including human rights, and the equality of sovereignty of states. Among the specific policy disputes discussed will be the Bush doctrine of preemptive war, 'humanitarian' intervention, and unilateralism/multilateralism. In all cases, we will discuss how to integrate political and moral considerations into all things-considered judgments about what to do here and now.

**PHIL 195 Controversies About Inequality (also SOC 222, PAM 222, ECON 222, ILRLE 222, and GOVT 222)**

**PHIL 201 Philosophical Puzzles (IV) (KCM)**
Spring. 4 credits. B. Hellie.
Certain concepts, like those of truth and infinity, give rise to puzzles or paradoxes. Consider, for instance, a claim that says, of itself, that it is not true. Is it true or not? Or what about Zeno's paradoxes of motion? Or what about a term like 'hairy': plucking one hair from a hairy man won't make him not hairy, but if you pluck 100K hairs successively from a man with 100K hairs, and none of the pluckings makes him not hairy, then he's still hairy when he has 0 hairs left over. We will learn something about the underlying logic behind these puzzles, so that we might learn something about the concepts they involve, even if we don't manage to solve them this semester.

**PHIL 211 Ancient Philosophy (also CLASS 231) (IV) (KCM)**
Fall. 4 credits. This course has no prerequisites. It is open to freshmen. A. Carpenter.
This course examines the origin and development of Western philosophy in Ancient Greece and Rome. We study some of the central ideas of the Pre-Socratics, Socrates, Plato, Aristotle, and the Hellenistic philosophers (Epicureans, Stoics, and Sceptics). Questions considered include: What are the nature and limits of knowledge? Is knowledge even possible? How reliable is perception? What are the basic entities in the universe: atoms, Platonic Forms or Aristotelian substances? Is moral knowledge possible? What is the natural state of happiness and what sort of life will make people happy? Do human beings have free will? Ought we to fear death? Among the fundamental works we read is Plato's Republic.

**PHIL 212 Modern Philosophy # (IV) (KCM)**
Spring. 4 credits. Z. Szabó.
An introductory course in philosophy with a strong emphasis on close reading of core texts. We will focus on the "early modern" period of the English and the French revolutions (1640-1789). We will cover four books by four of the most important philosophers of this era. Our main focus will be the metaphysical (or antimeetaphysical) views of the four authors. We will study their views on epistemology. Topics will include questions about the existence and nature of ideas, knowledge, causal connections, matter, soul, God, and freedom.

**PHIL 213 Existentialism (IV)**
Fall. 4 credits. K. Leighton.
According to Jean-Paul Sartre, "It is only in our decisions that we are important." While focusing on the relationship between action and ethics, this course will provide an introduction to the philosophy of existentialism, and will include work from such authors as Kierkegaard, Nietzsche, Heidegger, Sartre, de Beauvoir, and Fanon. We will explore such topics as the nature of human freedom, the role of desire in the constitution of the self, the relationship between justice and agency, bad faith, anxiety, and self-deception. In particular, we shall ask how Existentialist philosophy might offer a concept of ethics, especially in terms of its understandings of death and the self/other relationship. With this in mind, we will also consider the influence Existentialism has had on other theorists such as Lacan, Derrida, Foucault, and Levinas.

**PHIL 216 Sophomore Seminar: Self, Ego, Psycho # (IV) (KCM)**

**PHIL 221 Introduction to Deductive Logic (II) (MQR)**
Fall (H. Weatherston) and spring (H. Hodos). 4 credits each term.
The logic of truth-functional connectives, identity, and the universal and existential quantifiers; a formal language; translation between it and English; constructing worlds and models; and constructing proofs. We'll use a textbook accompanied by a software package, Language, Proof, and Logic by J. Barwise and J. Etchemendy.

**PHIL 231 Ethics (IV) (KCM)**
Spring. 4 credits. N. Sturgeon.
An introduction to the philosophical study of moral theories and moral arguments. Ethical relativism, ethical egoism, ethical skepticism, utilitarianism and deontological theories; some application to controversial contemporary issues.

**PHIL 242 Social and Political Philosophy (also GOVT 260) (III or IV) (KCM)**
K. Leighton.

**PHIL 244 Philosophy and Literature (IV)**

**PHIL 245 Ethics and Health Care (IV) (KCM)**
Spring. 4 credits. N. Sethi.
This course is an introduction to the ethical issues associated with contemporary medicine. No previous study of philosophy is presupposed. The course has two lectures and one discussion section per week. Topics include the professional-patient relationship (including informed consent, medical confidentiality, medical paternalism, and trust) and contemporary problems such as abortion and euthanasia. Beginning from these practical moral issues we investigate concepts such as illness, death, autonomy, quality of life and personhood, and health care in a just society. We consider competing conceptions of justice and arguments for entitlement to health care. Does justice require that all have access to basic health care? Does it require that all have access to the same level of health care? In addition to learning how to arrive at and defend ethical positions, we reflect on the techniques and methods we use.

**PHIL 246 Ethics and the Environment (also S&TS 206) (IV) (KCM)**
Spring. 4 credits. N. Sethi.
An introduction to feminist thought using a variety of texts (philosophical, historical, literary, legal, and political). Special attention is paid to sexual difference and the social construction of gender, and to how we frame various issues (e.g., whether pornography is primarily an issue of freedom of expression or about equal protection).

**PHIL 247 Ethics and Public Life (IV) (KCM)**

**PHIL 249 Feminism and Philosophy (also FGSS 249) (IV) (KCM)**
Fall. 4 credits. T. Gendler.
An introduction to feminist thought focusing on a wide range of texts (philosophical, historical, literary, legal, and political). Special attention is paid to sexual difference and the social construction of gender, and to how we frame various issues (e.g., whether pornography is primarily an issue of freedom of expression or about equal protection).

**PHIL 261 Knowledge and Reality (IV) (KCM)**
Fall. 4 credits. T. Bloser.
A course in feminist thought focusing on a wide range of texts (philosophical, historical, literary, legal, and political). Special attention is paid to sexual difference and the social construction of gender, and to how we frame various issues (e.g., whether pornography is primarily an issue of freedom of expression or about equal protection).

**PHIL 262 Philosophy of Mind (IV) (KCM)**
Fall. 4 credits. T. Blazer.
What is the mind? More specifically, what is the relationship between mental properties and physical properties? What is consciousness? What is the nature of mental states such as belief and desire? We explore philosophical attempts to shed light on each of these questions, and will discuss more generally how it is that one might think about thinking about them systematically.
experience of colors and sounds, and whether these can fit into functionalist or broadly physicalist theories of mind; and what is it to believe something or to desire something?

PHIL 263 Religion and Reason (also RELST 262) (RELCM)
Spring. 4 credits. S. MacDonald.
What must (or could) God be like, and what reasons do we have for thinking that a being of that sort actually exists? What difference would it make for theistic or nonexistence of God make to our lives? This course examines the idea, common to several major world religions, that God must be an absolutely perfect being. What attributes must a perfect being have? Must it have a mind, be a person, care for human beings? Is the concept of a perfect being coherent? Is the existence of a perfect being compatible with the presence of evil in the world and the existence of human freedom? Does human morality depend in any important way on the nature or will of a perfect being? Is a perfect being among the things that actually inhabit our universe? The course approaches these questions with the tools and methods of philosophical reason and through readings drawn from both classic texts and contemporary philosophical discussion.

PHIL 286 Science and Human Nature (also S&TS 286) (IV) (KCM)
Spring. 4 credits. R. Boyd

Intermediate or Advanced Courses
Some of these courses have prerequisites.

PHIL 308 Hellenistic Philosophy (also CLASS 341) (IV) (KCM)

PHIL 309 Plato (also CLASS 339) (IV) (KCM)

PHIL 310 Special Topics in Greek Literature: Aristotle (also CLASS 310) (IV) (KCM)
Spring. 4 credits. C. Taylor.

PHIL 311 Modern Rationalism
Fall. 4 credits. Prerequisite: one course in philosophy at the 200 level or above. PHIL 212 or its equivalent strongly recommended. A. Chignell.

PHIL 312 Modern Empiricism (IV) (KCM)

PHIL 314 Ancient Philosophy (IV) (KCM)

PHIL 315 Medieval Philosophy (IV) (KCM)
Fall. 4 credits. S. MacDonald.
A survey of some main themes and major figures in medieval philosophy. Emphasis will be on the close reading and analysis of representative texts, but some attention will be given to the general historical development of philosophical themes and traditions during the thousand years separating late antiquity and the Renaissance. Readings (in English translation) may include Augustine, Boethius, Anselm, Abelard, Aquinas, Scotus, and Ockham and address topics in metaphysics, epistemology, ethics, and philosophical theology.

PHIL 316 Kant (IV) (KCM)
Fall. 4 credits. Prerequisite: two courses in philosophy at the 200-level or above. PHIL 212 or its equivalent should be one of them; otherwise, approval of the instructor is required. A. Chignell.
An in-depth study of the philosophy of Kant as found in the Critique of Pure Reason. Topics include: space and time, the role of the mind in perceiving experience, causation, appearance and reality, the limits of speculative metaphysics, the nature of the self, freedom/determinism, arguments for God's existence. The goal is to present Kant's metaphysical and epistemological doctrines as clearly as possible, and to evaluate arguments for and against them.

PHIL 317 Hegel (IV)

PHIL 318 Origins of Twentieth-Century Philosophy (IV)

PHIL 319 Twentieth-Century Analytic Philosophy (IV)
Spring. 4 credits. B. Weatherston.
The rise and fall of logical positivism and of ordinary language philosophy. Quine.

PHIL 330 The Foundations of Mathematics (II) (MQR)
Fall. 4 credits. H. Hodes.
Topic for fall 2004: set theory as a foundation for mathematics, with some attention to its philosophical motivations. This class will cover the ZF axioms, functions, relations and orderings in the set-theoretic context, ordinal numbers, cardinal numbers, and the construction of the standard number systems.

PHIL 331 Deductive Logic (also MATH 281) (II) (MQR)
Fall. 4 credits. H. Hodes.
The syntax and model-theory of classical propositional logic and classical predicate logic, including proofs of the soundness and completeness of Natural Deduction formalizations of these logics, with some attention to related material.

PHIL 332 Philosophy of Language (IV)
Fall. 4 credits. Z. Szabo.
This course is an introduction to contemporary philosophy of language. It will not, however, aim at covering all the ground; instead, we will focus almost exclusively on questions of singular reference. Problems surrounding the use of singular terms in natural languages play an important role in philosophical reflection, so working through this course will help you orient in contemporary analytic philosophy. In relation to singular reference, we will touch on a number of important issues including the problem of negative existentials, the status of modalities, the nature of intensionality, and the interpretation of propositional attitudes.

PHIL 333 Problems in Semantics (also LING 333 and COGST 333) (III or IV) (KCM)

PHIL 334 Pragmatics (also LING 425) (III or IV)

PHIL 341 Ethical Theory (IV) (KCM)
Fall. 4 credits. T. Hinton.
In this class, we will examine questions in both meta-ethics and normative ethics. We begin with a brief overview of the main developments in meta-ethics that took place during the twentieth century. These include G. E. Moore's antinaturalist pluralism, emotivism, John Mackie's error theory, and several varieties of objectivism and realism. Our aim, in part, is to understand the reasoning that underlies realist and antirealist approaches to ethics. In addition, we want to know how the various metaethical, normative, and epistemological possibilities have been conceived and which of them make best overall sense of ethics as we understand it. We then work our way through Christine Korsgaard's Sources of Normativity, attempting to clarify the meaning of what she calls "the normative question," as well as the broadly Kantian answer she supplies to it. In the next part of the course, we investigate a number of questions arising in connection with consequentialism. These include worries about the demandingness of morality, the idea of maximizing impersonal goodness, and the place of rights in our moral thought. After this, we study T. M. Scanlon's contractualist moral theory as expounded in What We Owe to Each Other. Here we will focus on the distinctive account Scanlon offers of moral wrongness as well as on some of the issues about practical reason arising from that account. The course may end with a brief foray into meta-ethics, in which we take up the topic of moral relativism.

PHIL 342 Law, Society, and Morality (IV) (KCM)
Fall. 4 credits. M. Moody-Adams.
This course introduces the philosophy of law, emphasizing the nature of law and its relation to moral principle. Theories discussed include natural law, legal positivism, legal realism, and contemporary interpretive and critical theories of law. Other topics include the idea of an obligation to obey the law and the relevance of justice to law. Particular attention is given to the institution of slavery and its aftermath.

PHIL 344 History of Ethics: Ancient and Medieval (IV) (KCM)

PHIL 345 History of Ethics: Modern (IV) (KCM)

PHIL 346 Modern Political Philosophy (also GOVT 362) (III or IV) (KCM)
Fall. 4 credits. R. Miller.
A study of the leading contemporary theories of justice, including the work of Rawls, Nozick, Gauthier, and Scanlon. In discussing these theories and their critics, we will encounter radically different accounts of the
moral significance of economic inequality, the kinds of freedom that governments ought to protect; the kinds of values and convictions that a proper basis for laws (as opposed to being private matters); the tension between unequal political influence and democratic rights; and the roles of community, virtue, and group-loyalty in political justification. While maintaining, exploring these rival conceptions of freedom, equality, community, and obligation, we will also examine the implications of these theories for specific political controversies (e.g., abortion, welfare programs, and pornography).

PHIL 347 Global Justice (also GOVT 368) (III or IV) (KCM)
Spring. 4 credits. B. Miller.
A study of the leading debates over the nature of justice among governments and people throughout the world. What are the obligations of well-off people in rich countries to help the foreign poor? What principles of fairness should be observed in international economic arrangements? To what extent do governments have a right to control their territories without foreign intervention? What kind of warfare is morally permissible? What is the moral significance of nationality and the aspiration to national self-determination? To what extent can just international institutions and decision-makings reflect inequalities in power among governments? Readings include work by political philosophers, political scientists, and economists and will sometimes involve specific case studies.

PHIL 348 Philosophy and Literature (IV) (KCM)

PHIL 349 Feminism and Philosophy (IV) (KCM)

PHIL 361 Epistemology (IV) (KCM)
Spring. 4 credits. T. Gendler.
This is an upper-division course suitable for graduate students, and for advanced undergraduates who have already taken at least two philosophy courses. The course will introduce the student to a number of the topics and texts that have set the agenda for contemporary discussions in epistemology. Topics will be chosen from among the following: skepticism, the problem of defining knowledge, foundationalism and coherence, epistemic justification, internalism and externalism, epistemic contextualism, perception, and a priori knowledge. Most readings will be selected from those collected in Readings in Contemporary Epistemology (Oxford: S. Berncker and F. Drejske, eds.) and Epistemology: An Anthology (Blackwell: E. Sosa and J. Kim, eds.).

PHIL 364 Metaphysics (IV) (KCM)
Spring. 4 credits. D. Graff.
The focus of the course this semester will be identity at a time and identity over time. I can destroy a statue by melting it, without destroying the bronze it is made of. Does this mean that the statue and the bronze are different objects, even though they may at a time occupy the same region of space? If while at sea we gradually replace all the parts of our ship, will we be on the same ship at the end of the repairs that we were on at the beginning? What sorts of changes could a person undergo, and still be the same person? We will examine these and other puzzles in an effort to understand the relation of a thing to its parts and to the matter that constitutes it, as well as to explore some important differences between artifacts and persons. Readings will be primarily from contemporary analytic philosophers, including Lewis, Parfit, Shoemaker, Van Inwagen, and Williams. We will look at historical sources as well.

PHIL 381 Philosophy of Science: Knowledge and Objectivity (also S&TS 361) (IV) (KCM)
Fall. 4 credits. R. Boyd.
An examination of central epistemological and metaphysical issues raised by scientific theorizing: the nature of evidence; scientific objectivity; the nature of theories, models, and paradigms; and the character of scientific revolutions.

PHIL 382 Philosophy and Psychology (IV)

PHIL 383 Choice, Chance, and Reason (II) (MQR)

PHIL 384 Philosophy of Social Science
Spring. 4 credits. Prerequisite: one class in philosophy. T. Hinton.
This course will investigate philosophical questions that arise in connection with social-scientific inquiry. Some of these questions have to do with explanation. For instance, we might be troubled by the special place that rationality has in explaining human conduct. What is a rational choice explanation? What assumptions do we need to make about an agent to think of her conduct as rational? Other questions are metaphysical. For example, we want to know about the ontology of the social world. Are countries (like Argentina) and organizations (like the United Nations) social entities in some irreducible way? Other questions are harder to classify. Among them are concerns over whether value-freedom is desirable in social science, and worries about cognitive relativism and the role of the concept of false consciousness in explaining certain social phenomena.

PHIL 390 Informal Study
Fall or spring. Credit TBA.
To be taken only in exceptional circumstances. Must be arranged by the student with his or her adviser and the faculty member who has agreed to direct the study.

Advanced Courses and Seminars
These courses are offered primarily for majors and graduate students.

PHIL 409 German Philosophical Texts (IV) (KCM)

PHIL 410 Latin Philosophical Texts # (IV) (KCM)
Fall and spring. Variable credit. Prerequisites: knowledge of Latin and permission of instructor. S. MacDonald.
Reading of philosophical texts in the original Latin.

PHIL 411 Greek Philosophical Texts (also CLASS 611) # (IV) (KCM)

PHIL 413 Topics in Ancient Philosophy (also CLASS 413) # (IV) (KCM)
Fall. 4 credits. A. Carpenter.
An examination of Plato’s ethics across several dialogues. We will focus particularly on the sorrows of ethical theory (if any) to which Plato is committed, and the place of particularity in moral reasoning about a world informed by a goodness which it never fully instantiates.

PHIL 415 Topics in the History of Philosophy

PHIL 416 Modern Philosophy # (IV) (KCM)

PHIL 431 Mathematical Logic (also MATH 481) (II) (MQR)
Spring. 4 credits. Prerequisites: MATH 222 or PHIL 225 and either one course in post-calculus algebra or the permission of the instructor. H. Hodes.

PHIL 432 Topics in Logic (also MATH 482) (II) (MQR)
Spring. 4 credits. Prerequisite: at least one previous course in logic at or above the level of PHIL 331 (MATH 281), either one course in post-calculus algebra or the permission of the instructor. H. Hodes.

PHIL 433 Philosophy of Logic (IV)

PHIL 435 Pragmatics (also LING 425) (III or IV) (KCM)

PHIL 436 Intensional Logic (also LING 483 and MATH 483) (II) (MQR)
Spring. 4 credits. Prerequisites: i) Deductive Logic (PHIL 481 and PHIL 531; or ii) Introduction to Deductive Logic (PHIL 231) with a A- or better; or (iii) successful completion of any course which presupposes a significant portion of either of the above, such as Mathematical Logic (MATH 481 and PHIL 431) or The Foundations of Mathematics (MATH 484 and PHIL 434). With permission of the instructor, students who do not have a background in logic may take this course if they have successfully completed a rigorous, theoretical, proof-based course in the mathematics or computer science departments. D. Graff.
In this course we will investigate various logics of necessity and possibility ("modal logic"). We will study formal proof procedures as well as possible-worlds semantics. We will also prove various "meta" results, including completeness theorems, rendering this course a good introduction to mathematical as well as philosophical techniques learned in this part of the course will then be applied to the study of conditionals. Further topics will be among the following: quantified modal logic, two-dimensional modal logic, counterpart theory, and epistemic logic.

**PHIL 441 Contemporary Ethical Theory (IV) (KCM)**

**PHIL 447 Contemporary Political Philosophy (also GOVT 465) (III or IV) (KCM)**

**PHIL 464 Metaphysics (IV) (KCM)**

**PHIL 471 Ancient Philosophy (also CLASS 671)**
Spring. 4 credits. C. Taylor.
Ancient ethical theory, with particular focus on Plato and Aristotle.

**PHIL 482 Philosophy of Mind (IV) (KCM)**
Spring. 4 credits. T. Bloser.

**PHIL 483 Choice, Chance, and Reason (IV) (KCM)**
Fall. 4 credits. B. Weatherston.
The theory of decision-making under uncertainty. We will first look at the most widely accepted theories of how to make decisions and play games, and then look at some philosophical questions they raise. Should decision theory distinguish between games of chance and situations of genuine uncertainty? What should be the connection between the theory of decision and the theory of games? Are the frequent violations of theory by experimental subjects evidence that people are irrational or that the theory is mistaken? How should we resolve paradoxes involving infinite utility? Can decision theory or game theory be part of good scientific explanations?

**PHIL 490 Special Studies in Philosophy**
Fall and spring. 4 credits. Open only to honors students in their senior year. See Honors description at the beginning of the Philosophy section.

**PHIL 611 Ancient Philosophy (also CLASS 671)**
Spring. 4 credits. C. Taylor.
Ancient ethical theory, with particular focus on Plato and Aristotle.

**PHIL 633 Philosophy of Language: Tense and Time (also LING 700)**
Spring. 4 credits. Graduate-level course work in linguistic semantics or philosophy of language, as well as familiarity with formal logic are prerequisites. D. Abusch and Z. Szabo.
This research seminar will include six invited speakers who are working on the syntax and semantics of tense and on philosophical issues about the nature of time. Our aim is intense interdisciplinary work on these questions.

**PHIL 641 Ethics and Value Theory**
Fall. 4 credits. N. Sturgeon.
Topic for 2004–05: Relativism, Realism, Subjectivism, and Noncognitivism in Ethics.

**PHIL 643 Social and Political Philosophy**
Spring. 4 credits. R. Walker.
Topic for 2005: Reconciling Liberalism. A discussion of philosophical challenges to traditional liberal political goals and recent reinterpretations of these goals in terms of favored conceptions of community, citizenship or the good life. Our questions will include: what goals of economic equality (if any) survive the challenges? To what extent do evaluations of ways of life play a legitimate role in political choice? What political ideals of community (if any) give adequate scope to civil liberties and individual autonomy? What appeals to ties of citizenship or community are compatible with international duties of justice? Our readings will include work by Anderson, Frankl, Strauss, and Scanlon.

**PHIL 652 Philosophy of Perception**

**PHIL 663 Philosophy of Psychology**
Fall. 4 credits. T. Gerringer.
A research seminar directed at graduate students in philosophy, psychology, and cognitive science. Our focus will be on identifying and discussing issues of philosophical significance raised by recent work in cognitive, developmental, and social psychology. Our primary readings will be journal articles in psychology and philosophy. Likely topics include recent work on autism and theory of mind, recent work on the automativity of social behavior, and recent work on motor planning and the common coding of perception and action.

**PHIL 666 Metaphysics**

**PHIL 667 Metaphysics**

**PHIL 669 Conflict, Cooperation, and the Norm: Ethical Issues in International Affairs (also GOVT 491 and GOVT 691)**
Fall. 4 credits. H. Shue.
We examine selected normative elements of international affairs, divided into three interlocking clusters. First are issues of conflict, including both low-intensity military intervention and nuclear weapons. Second are questions of cooperation, especially between rich nations and poor nations. Third are debates about the authority and status of the major players in the international system: individual persons, nation-states, and international regimes. Questions considered include: is war justifiable by some nations of nuclear weapons morally justified? Is the world economy unjust? Should national governments be pressured to respect individual human rights?

**PHIL 700 Informal Study**
Fall or spring. Credit TBA.
To be taken by graduate students only in exceptional circumstances and by arrangement made by the student with his or her Special Committee and the faculty member who has agreed to direct the study.

**PHYSICS**
The Department of Physics offers a full range of university-level work in physics, from general education courses for non--scientists to doctoral-level independent research. Major research facilities are operated by two component organizations, the Laboratory of Atomic and Solid State Physics (LASSP) and the Laboratory for Elementary Particle Physics (LEPP). LASSP carries on extensive research efforts in condensed-matter physics and biophysics. LEPP operates a major high-energy particle physics research facility at Wilson Laboratory, the Cornell electron–positron storage ring (CESR). Theoretical work is carried out in many fields of physics, including astrophysics. There is a schedule of weekly research-oriented seminars and colloquia. Students will find many opportunities for research participation and summer employment.

Introductory physics sequences are: 101–102, 207–208, and 112–213–214, or its more analytic version 116–217–218. In addition, there is a group of general-education courses, PHYS 200–206, 209, 210. PHYS 101–102, a self-paced autotutorial course, is designed for students who do not intend to take further physics courses and who do not have preparation in calculus. PHYS 112 and 207 both require calculus (MATH 190 or 191 or 111), and additional mathematics is required for subsequent courses in the sequence. PHYS 101–102 or 207–208 may be taken as terminal physics sequences. The three-term sequences 112–213–214 or 116–217–218, are recommended for engineers and physics majors.

Courses beyond the introductory level that might be of interest to nonmajors include PHYS 116 (Modern Physics D), PHYS 330 (Modern Experimental Optics); and PHYS 360 (Electronic Circuits).

Advanced placement and credit are offered as outlined in "Advanced Placement of Freshmen," or students may consult the
The Major

The major program is constructed to accommodate students who wish to prepare for professional or graduate work in physics as well as those who wish to complete their major program in the field of physics but have other post-graduation goals.

Students who wish to major in physics are advised to start the physics sequence in the first term of their freshman year. The major program can still be completed with a second-term start, but flexibility in future course scheduling is reduced.

Prospective majors are urged to make an early appointment at the physics office for advice in program planning. 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. The department office will give advice in the manner of selecting a major faculty adviser. Details of the major course program are worked out in consultation between the student and major adviser.

Physics Core

Common to all major programs is a requirement to complete a core of physics courses. In addition to the three-term introductory sequence (PHYS 112-213-214 or PHYS 116-217-218), the core includes five upper-level courses—a) the two-course sequence in modern physics (PHYS 316-317), b) at least three semester hours of laboratory work selected from PHYS 310, 330, 360, 410, ASTRO 410, c) an intermediate course in classical mechanics, and d) an intermediate course in electromagnetism.

Accompanying these physics courses should be work in mathematics through at least MATH 222 or 294. Students following the professional/graduate school channel are expected to complete at least one additional year of applicable mathematics (A&EP 321-322 or appropriate selections from mathematics).

In addition to the core, each physics major must complete 15 semester hours of credit in an area of concentration that has been agreed on by the student and major faculty adviser.

Concentration within Physics

A student who wishes to pursue professional or graduate work in physics or a closely related field should follow a concentration within the field of physics. For those students with a strong secondary school preparation, the sequence PHYS 116-217-218 is encouraged. Students are strongly encouraged to start the sequence with PHYS 116, even if they qualify for advanced placement credit for PHYS 112. Core courses in mechanics and electromagnetism will normally be PHYS 318 and PHYS 327, respectively. The minimum 15 hours beyond the core must be composed of physics courses with numbers greater than 300 and must include the senior laboratory course PHYS 410. This means a physics concentration needs a minimum of 7 credit hours of laboratory work to complete the requirements. The accompanying table shows several typical course sequences.

by means of which the major requirements may be completed. The primary distinction among students who may follow the different sequences is the amount and level of pre-college work in calculus and in physics. Changes in these typical patterns will be common, as agreed on between student and major faculty adviser. Research work is encouraged of all majors. If this work is done as an independent project, PHYS 490, up to eight credits can be applied to the concentration.

Concentration outside Physics

Such a concentration will reflect the student’s interest in some area related to physics. The array of courses that comprise the concentration must have internal coherence. The array will normally be worked out in conference with the major faculty adviser and must be approved by the adviser. Of the required 15 hours credit beyond the core, at least eight credits must be in courses numbered above 300. Students have chosen to concentrate in such topics as chemical physics, astrophysics, natural sciences, history and philosophy of science, computer science, meteorology, or econometrics. A combined biology-chemistry concentration is appropriate for pre-medical students or those who wish to prepare for work in biophysics.

For students with concentrations outside physics, the core requirements in mechanics and electromagnetism can be appropriately met with PHYS 314 and PHYS 323, respectively.

Students with an astronomy concentration who might continue in that field in graduate school should use ASTRO 410, 431, 432 as part of the concentration; they are encouraged to use PHYS 318 and 327 to satisfy the core requirements in mechanics and electromagnetism.

Typical Physics Course Sequences (other sequences are also possible)

Semester | No AP math or physics | 1 year AP calculus and good HS physics | Outside concentrators | Outside concentrators (alternate)
--- | --- | --- | --- | ---
1st - Fall | 112 | 116 | 112 | 112
2nd - Spring | 213 | 217 | 213 | 213
3rd - Fall | 214 | 218 | 214 | 214
4th - Spring | 316, 3x0 | 316, 3x0 | 3x0 | 214
5th - Fall | 317, 327, 3x0 | 317, 327, 3x0 | 3x0 | 3x0, 316
6th - Spring | 314/318, 443 | 318, 443 | 314 | 314, 3x0
7th - Fall | 341, 410 | 341, 410 | 317, 323 | 317, 323
8th - Spring | Elective(s) | Elective(s) | | |

- For majors with concentrations outside physics, there will be wide variation in individual programs, arranged to best match the field of concentration.
- Crossovers between the two sequences 112–113–214 and 116–217–218 are possible, although the combination 112–213–214 is difficult. PHYS 207 may be substituted for PHYS 112. Students taking 217 after 112 must co-register for 216.
- Students taking the honors sequence 116–217–218 are strongly encouraged to start with PHYS 116. Exceptionally well-prepared students may be able to begin work at Cornell with PHYS 217. Such students should visit the department office for advice in planning a course program.
- Physics electives for the major include 360, 444, 454, 455, 480, 490, 525, 553, 561, 572, the senior seminars 481–489, ASTRO 332 or 431–432, and A&EP 434.
- One semester of intermediate laboratory, listed here as 3x0, is required.
- Well-prepared sophomores wishing to take PHYS 318 should consult the instructor before registering.

Honors

A student may be granted honors in physics upon the recommendation of the Physics Advisers 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. It should be noted, however, that 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

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 of the courses in each group.

PHYS 101, 112, 116, 207
PHYS 102, 208, 213, 217
PHYS 214, 218
PHYS 314, 318
PHYS 323, 327
PHYS 116, 216

In addition, students with credit for PHYS 101, 112, 116, or 207, or an advanced placement equivalent who wish to enroll in PHYS 200–206, 209, or 210 should obtain written permission from the instructor and the director of undergraduate studies in physics.
Course Prerequisites
Prerequisites are specified in physics course descriptions to illustrate the materials that students should have mastered. Students who wish to plan different from those suggested by the prerequisite ordering are urged to discuss their preparation and background with a physics adviser or with the instructor in the course. In many cases an appropriate individual program can be worked out without exact adherence to the stated prerequisites.

Courses

**PHYS 012 PHYS 112 Supplement**
Spring. 1 credit. S-U only. R. Lieberman.
Provides backup instruction for PHYS 112. Recommended for students who either feel insecure about taking PHYS 112 or simply want to develop their problem-solving skills.

**PHYS 013 PHYS 213 Supplement**
Fall. 1 credit. S-U only. R. Lieberman.
Provides backup instruction for PHYS 213.

**PHYS 101 General Physics I (I) (PBS)**
Fall, summer (6-week or 4-week session). 4 credits. General introductory physics for non-physics majors. Prerequisites: 3 years of high school mathematics, including some trigonometry. A student without high school physics should allow extra time for PHYS 101. Includes less mathematical analysis than PHYS 207, but more than PHYS 200–206, 209, 210. Enrollment may be limited. Fall introductorylec. R. Aug. 26 or M. Aug. 30. Staff.

**PHYS 102 General Physics II (II) (PBS)**
Spring, summer (8 weeks, or second 4 weeks only for those doing PHYS 101 in first 4 weeks). 4 credits. Prerequisite for PHYS 102. PHYS 101 or 112 or 207. Includes less mathematical analysis than PHYS 208. but more than PHYS 200–206, 209, 210. Enrollment may be limited. Spring introductorylec. M Jan. 24. Staff. PHYS 101–II: 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 term. Most instruction occurs in the learning center with personal tutoring by staff, assigned readings, problems, laboratory exercises, videotaped lectures, and solutions of sample test questions at our web site. Unit testing is designed to measure mastery with a limit of three test tries taken at the time of the student's choice. Major topics for 102: electricity and magnetism, optics, relativity, quantum, nuclear, and particle physics. At the level of College Physics, first edition, by Giambattista, Richardson, and Richardson.

**PHYS 103 General Physics I (I) (PBS)**
Summer. 4 credits. Prerequisite: 3 years of high school mathematics, including trigonometry. A student without high school physics should allow extra time for PHYS 103. PHYS 103 is a more traditional version of PHYS 101. PHYS 103 is not appropriate for students majoring in physics or engineering; it is primarily for students majoring in the life sciences. Lectures and discussions. M–F. laboratories M–W. Basic principles treated quantitatively but without calculus. Topics include kinematics: forces and fields, momentum, angular momentum, and energy; thermal physics and fluid mechanics; solid mechanics. Text at the level of College Physics, first edition, by Giambattista, Richardson, and Richardson.

**PHYS 112 Physics I: Mechanics (I) (PBS)**
Fall, spring, summer (6-week session). 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisite: registration in MATH 192 (preferred) or MATH 112; students with substantial previous contact with introductory calculus who coregister in MATH 191 or 111 may enroll, but in this case subsequent physics courses (213, 214) will employ some math concepts prior to their completion in the calculus sequence. Lec, M W F. Two rec. weekly and one lab session approximately every other week. Evening exams. Fall. P. Krassik; spring. P. M. Posor. Course covers the mechanics of particles with focus on kinematics, dynamics, conservation laws, central force fields, periodic motion. Mechanics of many-particle systems: center of mass, rotation of rigid body, and static equilibrium. At the level of University Physics, Vol. 1, by Young and Freedman.

**PHYS 116 Physics I: Mechanics and Special Relativity (I) (PBS)**
Fall, spring. 4 credits. More analytic than PHYS 112, intended for students who will be comfortable with a deeper, somewhat more abstract approach. Intended mainly but not exclusively for prospective majors in physics, astronomy majors, or applied and engineering physics majors. Prerequisites: a good secondary school physics course, familiarity with basic calculus, and enjoyment of puzzle-solving. Corrective transfers between PHYS 116 and PHYS 112 (in either direction) are encouraged during the first three weeks of instruction. Two recitations each week and six 2-hour labs. Lec M W F. Fall. V. Elser; spring, staff.

A more rigorous version of PHYS 112, covering similar topics at the level of An Introduction to Mechanics by Kleppner and Kolenkow.

**PHYS 117 Concepts of Modern Physics**
Fall. 1 credit. S–U only. Enrollment may be limited. Coregistration in PHYS 112 or 116 or 213 or 217 is required. For freshmen who plan to major in physics, applied and engineering physics, or astronomy. Lec. W. A. Sadoff.

This course is intended for freshmen who plan to major in physics and related fields (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 methods of symmetry and conservation laws, quantum theory, the unification of forces and matter, and high-bang cosmology.

**PHYS 190 Supplemental Introductory Laboratory**
Fall. 1 credit. Times by arrangement with instructor. S–U only. Enrollment limited to students who have all of the following: 1) 3 transfer credits for introductory physics lecture material; 2) a degree requirement for the laboratory component of that introductory course; 3) approval of the director of undergraduate studies; and 4) permission of the lecturer of that course at Cornell. Enrollment limited.

A PHYS 190 permission form must be filed in 121 Clark Hall with the physics department course coordinator. Students perform the laboratory component of one of the introductory courses (PHYS 112, 207, 208, 213, 214) to complement the lecture-related course credit acquired elsewhere. A PHYS 190 credit will count toward the equivalent of one of these introductory courses at another institution should receive prior approval from the Cornell Physics director of undergraduate studies.

**PHYS 201 Why the Sky Is Blue: Aspects of the Physical World (I) (PBS)**
Fall. 3 credits. Lec. T R. rec. W. A. Sadoff.
This is a 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 character of physical laws as shown 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 202 Energy (I) (PBS)**
Fall. 3 credits. For nonscience majors. No specific prerequisites, but competence in high school–level mathematics needed. Some high school–level science (chemistry, physics, or earth science) desirable. Not offered 2004–2005.

The course will cover 1) the basic science of different kinds of energy (mechanical, electrical, thermal, gravitational, solar, nuclear) and 2) the energy conversion processes that power twenty-first century society. Weekly assigned problems, based on weekly study assignments, will be used as classroom study materials. In the latter part of the course, student projects will investigate more deeply particular energy sources or energy conversion processes.
We 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 areas 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 by persons and hypotheses, offering a humanistic perspective.

**PHYS 204 Physics of Musical Sound (I) (PBS)**

Spring. 3 credits. Intended for nonscientists; does not serve as a prerequisite for further science courses. Assumes no scientific background but will use high school algebra. K. Selby.

Many features of the production, propagation, and perception of musical sound can be understood in terms of physics concepts. Topics covered include how different musical instruments work and why they sound the way they do; musical scales, intervals and tunings; room acoustics; reproduction of sound; and hearing. Weekly homework assignments emphasize the development of science-writing skills as well as physics problem-solving. In addition to taking two prelim exams, students will write a research paper investigating a topic that interests them. Course content is at the level of The Science of Sound by Rossing, Moore, and Wheeler.

**PHYS 205 Reasoning about Luck (II) (PBS)**

Fall. 3 credits. Intended for nonscientists; does not serve as a prerequisite for further science courses and cannot be taken for credit by anyone who has taken a college-level physics course. P. Stein.

**PHYS 206 Physics in the News (I) (PBS)**


This course examines the physics concepts behind the news headlines. Typical topics include space exploration, global warming, medical imaging, magnetic levitation trains and electric cars, asteroid impacts, and other interesting headlines that may occur during the semester. This course is intended for nonscience majors and is mainly descriptive. Our tools for understanding these topics are some of the most basic principles of physics, illustrated using algebra at the high school level. Detailed lecture notes are provided on the web. Readings are from the scientific press at the level of Scientific American and the text by Hobson listed below. Students are encouraged to explore the social and environmental aspects of some of the more debatable topics through articles and web pages. At the level of Physics, Concepts and Connections, second edition, by Hobson.

**PHYS 207 Fundamentals of Physics I (I) (PBS)**

Fall. 4 credits. Prerequisites: high school physics prior to MATH 110, or 191, or a solid grasp of the basic notions of introductory calculus, combined with coregistration in a math course approved by the instructor. Lec: M W F; two recs and one lab each week. Evening exams. R. Thorne.

A two-semester introduction to physics, intended for students majoring in an analytically oriented biological science, a physical science, mathematics, or an analytically oriented social science. The combination of lectures illustrated with applications from the sciences, medicine, and everyday life. Weekly labs are tightly coupled to lectures that introduce computer-aided data acquisition and analysis, and recitations that emphasize cooperative problem-solving, to provide a rich exposure to the methods of physics and the basic analytical and scientific communication skills required by all scientists. Course covers mechanics, conservation laws, waves, and topics from thermal physics, fluids, acoustics, and properties of matter. At the level of Fundamentals of Physics, Vol. I, sixth edition, by Halliday, Resnick, and Walker.

**PHYS 208 Fundamentals of Physics II (I) (PBS)**

Spring. 4 credits. Prerequisites for PHYS 208: PHYS 207 or 112 or 191; students should have had substantial previous contact with introductory calculus through courses such as MATH 111, 190, or 191. PHYS 207-208 is a two-semester introduction to physics with emphasis on tools generally applicable in the sciences, intended for students majoring in a physical science, mathematics, or an analytically oriented biological science. Lec: M W F, two rec. and one lab each week. Evening exams. Course covers electricity and magnetism, and topics from geometrical and physical optics, quantum mechanics, and particle physics. At the level of Fundamentals of Physics, Vol. II, sixth edition, by Halliday, Resnick, and Walker.

**PHYS 213 Physics II: Heat/Electromagnetism (I) (PBS)**

Fall, spring, (summer 6-week session). 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisites: PHYS 112 and coregistration in the continuation of the mathematics sequence required for PHYS 112. Lec: T R, two rec each week and six 2-hour labs. Evening exams. Fall, L. Gibbons; spring, P. Stein.

Course topics include: temperature, heat, thermal energy, electrostatics, behavior of matter in electric fields, DC circuits, magnetic fields, Faraday's law, Maxwell's equations, and electromagnetic oscillations. At the level of University Physics, Vols. 1 and 2, by Young and Freedman. Laboratory covers electrical measurements, circuits, and some aspects of heat transfer.

**PHYS 214 Physics III: Optics, Waves, and Particle Physics (I) (PBS)**

Fall, spring. (summer 6-week session). 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisites: PHYS 213 and familiarity with differential equations. Two rec. each week and one 3-hour lab alternate weeks. Evening exams. Lec: T R. Fall, T. Arias; spring, staff.

Physics of wave phenomena, electromagnetic waves, interference and diffraction effects, wave properties of particles and introduction to quantum physics. Course includes computer use in solving problems and labs. At the level of University Physics, Vols. 1–3, by Young and Freedman.

**PHYS 215 Introduction to Special Relativity**

Fall, spring, weeks 4–6 based on preregistration. 1 credit. S-U only. Enrollment may be limited. Coregistration in this course is a requirement for the registration in PHYS 217, unless the student has taken a relative course at the level of PHYS 116 or ASTRO 106. Prerequisites: PHYS 112 or PHYS 207 or permission of instructor. Lec: T R. Fall, R. Thorne.

Introduction to Einstein's Theory of Special Relativity, including Galilean and Lorentz transformations, the concept of simultaneity, time dilation and length 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 217 Physics II: Electricity and Magnetism (also A&EP 217) (I) (PBS)**

Fall, spring, 4 credits. Enrollment may be limited. Intended for students who have done very well in PHYS 112 or 116 and in mathematics and who desire a more analytic treatment than that of PHYS 213. Prospective physics majors are encouraged to select PHYS 217. Prerequisites: approval of student's advisor and permission from the instructor. A placement quiz may be given early in the semester, permitting those students who find PHYS 217 too abstract or analytical to transfer into PHYS 215, which they can do without difficulty at that time. 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 the level of PHYS 116 or is currently enrolled in PHYS 216. It is also assumed that the student has covered the material of MATH 192 and is registered in MATH 295 or the equivalent. Lec: M W F Fall, A. LeClair; spring, staff.

At the level of Electricity and Magnetism, Vol. 2, by Purcell (Berkeley Physics Series).

**PHYS 218 Physics III: Waves and Thermodynamics (I) (PBS)**

Fall, spring. Enrollment may be limited. Intended for students who have done very well in PHYS 116 and 217 and in mathematics, and who desire a more analytic treatment than that of PHYS 214. Prospective physics majors are encouraged to select PHYS 218. Prerequisites: PHYS 217 (with a grade of B or higher) and completion of a course in differential equations or permission of instructor. Lec: M W F. Fall, D. Cassel; spring, H. Tse.

The first part of the course gives a thorough discussion of wave equations, including traveling waves, standing waves, energy, momentum, and transmission, interference and diffraction. We
derive wave equations on strings, for sound and light, and in elastic media. We cover Fourier series and linear partial differential equations. In some semesters, elasticity theory and tensor calculus may be introduced. In the second part of the course, we introduce thermodynamics and statistical mechanics, including heat engines, the Carnot cycle, and the concepts of temperature and entropy. In some semesters random walks and diffusion may be introduced. Evening exams may be scheduled. At the level of *Physics of Waves* by Eilmore and Heald.

**PHYS 310 Intermediate Experimental Physics (I) (PBS)**

Spring. 3 credits. Enrollment may be limited. Prerequisite: PHYS 208 or 213, Labs T R. Students select from a variety of experiments. An individual, independent approach is encouraged. Facilities of the PHYS 410 lab are available for some experiments.

**PHYS 314 Intermediate Mechanics (I) (PBS)**

Spring. 4 credits. Prerequisites: PHYS 208 or 214 (or equivalent) and MATH 294 (or equivalent). Assumes prior introduction to linear algebra and Fourier analysis. Intended for physics majors with some familiarity of physics or astronomy; PHYS 318 covers similar material at a more analytical level. Lec M W F, rec F. C. Franck. Likely topics include Lagrangian mechanics; Newtonian mechanics based on a variational principle; conservation laws from symmetries; two-body orbits due to a central force; analysis of scattering experiments; small amplitude oscillating systems including normal mode analysis; parametrically driven systems; rigid body motion, motion in non-inertial reference frames; and nonlinear behavior including bistability and chaos. Students not only become more familiar with analytic methods for solving problems in mechanics but also gain experience with computer tools. At the level of *Classical Dynamics* by Marion and Thornton.

**PHYS 316 Basics of Quantum Mechanics (I) (PBS)**

Fall, spring. 3 credits. Prerequisites: PHYS 214 or 218 and coregistration in at least MATH 214. It is assumed that majors registering in PHYS 316 will continue with PHYS 317. Lec, M W F. S. J. Davis. Topics include breakdown of classical concepts in microworlds; light and matter waves; Schrödinger equation and solutions for square well, harmonic oscillator, and the hydrogen atom; angular momentum, spin, and magnetic moments; identical particles and exclusion principle. At the level of An *Introduction to Quantum Physics* by French and Taylor.

**PHYS 317 Applications of Quantum Mechanics (I) (PBS)**

Fall. 3 credits. Prerequisite: PHYS 316. Lec, M W F; rec, F. G. Dugar. Course covers a range of applications of quantum mechanics to topics in modern physics. The course topics include: the physics of single and multi-electron atoms, quantum statistical mechanics, molecular structure, quantum theory of metals, band theory of solids, conductivity, nuclear structure, radioactivity, nuclear reactions, and elementary particle physics.

**PHYS 318 Analytical Mechanics (I) (PBS)**

Spring. 4 credits. Prerequisites: PHYS 116 or permission of instructor; A&EP 321 or appropriate course(s) in mathematics. Intended for physics majors concentrating in physics or astronomy. PHYS 314 covers similar material at a less demanding level. Assumes prior exposure to Fourier analysis, linear differential equations, linear algebra, and vector analysis. Lec, M W F; rec, F. M. Neubert. Newtonian mechanics of particles and systems of particles, including rigid bodies; oscillating systems, gravitation and planetary motion, moving coordinates and Euler's equations; Lagrange and Hamilton formulations; normal modes and small vibrations; introduction to chaos. At the level of *Classical Mechanics* by Goldstein, *Classical Dynamics* by Marion and Thornton, and *Analytical Mechanics* by Hand and Finch. Supplementary reading is assigned.

**PHYS 322 Intermediate Electricity and Magnetism (I) (PBS)**

Fall. 4 credits. Prerequisites: PHYS 208 or 213/214 (or equivalent) and MATH 293/294 (or equivalent); coregistration in A&EP 321 or appropriate course in mathematics recommended. Intended for physics majors with a concentration outside of physics or astronomy. PHYS 327 covers similar material at a more analytical level. Lec M W F, rec F. C. Franck. Topics include electro/magnetostatics, boundary value problems, dielectric and magnetic media, Maxwell's Equations, electromagnetic waves, and sources of electromagnetism. At the level of *Introduction to Electrodynamics* by Griffiths. **PHYS 327 Advanced Electricity and Magnetism (I) (PBS)**

Fall. 4 credits. Prerequisites: PHYS 217/218 or permission of instructor; coregistration in A&EP 321 or appropriate course(s) in mathematics. Intended for physics majors concentrating in physics or astronomy. PHYS 323 covers similar material at a less demanding level. N.B.: PHYS 327 assumes knowledge of the material at the level of PHYS 217, and makes extensive use of Fourier transforms, vector calculus, and complex variables. Lec M W F; rec F. C. Caski. Course covers electro/magneto-statics, vector and scalar potentials, Laplace's Equation and boundary value problems, multipoles, radiation-solutions to Maxwell's Equations, energy-momentum of radiation; electrodynamics in media; and special relativity-transformations, four vectors, particle kinematics and dynamics, relativistic electrodynamics. At the level of *Classical Electromagnetic Radiation* by Heald and Marion.

**PHYS 330 Modern Experimental Optics (also A&EP 330) (I) (PBS)**

Fall. 4 credits. Enrollment limited. Prerequisite: PHYS 214 or equivalent. Lec, W. lab, M. T. M. Wang. A 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. 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 341 Thermodynamics and Statistical Physics (I) (PBS)**

Fall. 4 credits. Prerequisites: PHYS 214, 316, and MATH 294. Lec, M W F; rec, R. P. Brouwer. Course covers statistical physics, developing both thermodynamics and statistical mechanics simultaneously. Also covers concepts of temperature, laws of thermodynamics, entropy, thermodynamic relations, and free energy. Applications to phase equilibrium, multicomponent systems, chemical reactions, and thermodynamic cycles. Application of statistical mechanics to physical systems, and introduction to treatment of Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics with applications. Elementary transport theory. At the level of *Fundamentals of Statistical and Thermal Physics* by Reif or *Introduction to Statistical Mechanics* by Betts.

**PHYS 360 Electronic Circuits (also A&EP 363) (I) (PBS)**

Fall, spring. 4 credits. S-U grade option available by permission of the instructor for students who do not require this course for their major. Prerequisites: undergraduate course in electricity and magnetism (e.g., PHYS 208, 213, or 217) or permission of the instructor. No previous electronics experience is assumed, although the course moves quickly through introductory topics such as basic dc circuits. Fall term usually has a smaller enrollment. Lec, M. Labs T R or W F; evening labs M W spring. Fall, E. Kirkland; spring, R. Thorne. Practical electronics as encountered in a scientific or engineering research/development environment. Analyze, design, build, and test circuits using discrete components and integrated circuits. Analog circuits: resistors, capacitors, filters, operational amplifiers, feedback amplifiers, oscillators, comparators, passive and active filters, diodes and transistor switches and amplifiers. Digital circuits: combinational and sequential logic (gates, flip-flops, registers, counters, timers), analog to digital (ADC) and digital to analog (DAC) conversion, signal averaging, computer architecture and interfacing. Additional topics may include analog and digital signal processing, light wave communications, transducers, and noise reduction techniques. At the level of *Art of Electronics* by Horowitz and Hill.

**PHYS 400 Informal Advanced Laboratory**

Fall, spring. Variable to 3 credits. Prerequisites: 2 years of physics or permission of instructor. Lab T W. Fall, D. Hartill; spring, staff. Experiments of widely varying difficulty in one or more areas, as listed under PHYS 410, may be done to fill the student's special requirements.

**PHYS 410 Advanced Experimental Physics**

Fall, spring. 4 credits. Limited to seniors except by special permission. Prerequisites: PHYS 214 (or 310 or 360) plus 318 and 327, or permission of instructor. Lec, M. Labs T W. Fall, D. Hartill; spring, R. Thorne. 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 443 Intermediate Quantum Mechanics (I) (PBS)
Spring. 4 credits. Prerequisites: PHYS 327 or 323, and PHYS 316 and A&EP 321 or appropriate course(s) in mathematics, or registration in PHYS 314 or 318, or permission of instructor. Assumes prior experience in linear algebra, differential equations, and Fourier transforms. Lec. M W T. rec. C. T. Teukolsky.
This course provides an introduction to concepts and techniques of quantum mechanics, at the level of An Introduction to Quantum Mechanics by Griffiths.

PHYS 444 High-Energy Particle Physics (I) (PBS)
Spring. 4 credits. Prerequisite: PHYS 443 or permission of instructor. Lec. M W F, rec. F. 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 445 Introduction to General Relativity (also ASTRO 445)
Fall. 4 credits. The course is offered as an alternative to the more comprehensive, two-semester graduate sequence PHYS 553 and 554, E. Flanagan.
A 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 new textbook Gravity: An Introduction to Einstein’s General Relativity by James Hartle.

PHYS 451 Classical Mechanics, Nonlinear Dynamics, and Chaos (also PHYS 551) (I) (PBS)
Spring. 3 credits. Only students with a strong performance in PHYS 318 or the equivalent will be admitted to the course. Biweekly two-hour seminar to be scheduled. Lec. M W T. Not offered 2004-2005.

PHYS 454 Introductory Solid-State Physics (also A&EP 450) (I) (PBS)
Fall. 4 credits. Prerequisite: PHYS 443, A&EP 461, or CHEM 729 is highly desirable but not required. Lec. M W F.
Computer lab. W or R. W. Wise.
An introduction to modern solid-state physics, including crystal structure, lattice vibrations, electrical theory of solids 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 455 Geometrical Concepts in Physics (I) (PBS)
Spring. 4 credits. Prerequisite: PHYS 323 or equivalent and at least coregistration in PHYS 318 or permission of instructor. Usually offered every other spring. Not offered 2004-2005.

PHYS 456 Introduction to Accelerator Physics and Technology (also PHYS 456) (I) (PBS)
Fall. 3 credits. Prerequisites: Intermediate E&M (PHYS 323 or 327) and Classical Mechanics (PHYS 314 or 318). Lec. T R. Not offered 2004-2005. G. H. Hoffstaetter.
Fundamental physical principles of particle accelerators and enabling technologies, with a focus on circular high-energy colliders, such as the Cornell Electron Storage Ring (CESR).

PHYS 457 The Storage Ring as a Source of Synchrotron Radiation (also PHYS 557) (I) (PBS)
Spring. 3 credits. Prerequisites: intermediate-level mechanics (PHYS 314 or 327) and E&M (PHYS 323 or 327) or permission of instructor. Previous completion of PHYS 455 is not required. Lec. T R. Offered 2004-2005. S. Gruner and R. Talman.
Physics of synchrotron radiation with a focus on characteristics of radiation from dipole magnets, electron beam properties that influence radiation characteristics, and issues of flux, brightness, emittance, brilliance, beam stability, and beam lifetime. Regular lectures alternate with visit lectures on specialized topics on radiation from insertion devices (i.e., wigglers and undulators), X-ray optics, coupling to beams, and features of X-ray beams. Special emphasis is placed on understanding the requirements of experimental X-ray applications and hands-on opportunities for doing synchrotron radiation experiments.

PHYS 480 Computational Physics (also PHYS 680 and ASTRO 650) (I) (PBS)
Spring. 3 credits only. The course assumes familiarity with the standard mathematical methods for the physical sciences and engineering, differential equations and linear algebra in particular and with computer programming (e.g., Fortran or C). Lec. T R T. Arias.
This course covers numerical methods for ordinary and partial differential equations, linear algebra and eigenvalue problems, nonlinear equations, and fast Fourier transforms from the hands-on perspective of how they are used in modern computational research in the era of open software and the web. Depending on the instructor, the course emphasizes different areas of computational science. Emphasis ranges from general methods for tackling PDEs, including finite-difference and spectral methods, to developing your own working ab initio computer program for calculating the properties of molecules and materials with the methods that won Walter Kohn and John Pople the Nobel prize in Chemistry in 1998.

PHYS 481 Quantum Information Processing (also PHYS 681 and COMS 483)
Spring. 2 credits. S-U only. The only essential prerequisite is familiarity with the theory of finite-dimensional vector spaces over the complex numbers. Lec. T R. N. David Mermin.
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. Though implementation will be extremely difficult to achieve, the theory of quantum computation offers striking new perspectives on computation and information, as well as on the quantum theory itself. This course is intended both for physicists, unfamiliar with computational complexity theory, and computer scientists and mathematicians, unfamiliar with the principles of quantum mechanics. Topics are likely to include an introduction to the relevant principles of quantum physics, a survey of elementary quantum computational magic, Shor's factoring algorithm, Grover's search algorithm, quantum error correction, quantum cryptography, and the teleportation of quantum states.

PHYS 486 Selected Topics in Accelerator Technology (also PHYS 687)
Fall. 2 credits. S-U only. Prerequisites: intermediate E&M (PHYS 323 or 327). Lec. T R. Offered 2004-2005.
Fundamentals of accelerator technology. This course consists of a series of topical seminars covering the principal elements of accelerator technology.

PHYS 488 Advanced Topics in Accelerator Physics (also PHYS 688) (I) (PBS)
Fall. 3 credits. S-U only. Lec. M W. G. H. Hoffstaetter.
Covers fundamental physical principles of particle accelerators and enabling technologies.

PHYS 490 Independent Study in Physics
Fall or spring. Variable to 4 credits. Students can apply a maximum of five PHYS 490 credits to the physics major.
Prerequisite: permission required of instructor who will direct proposed work.
A copy of the Request for Independent Study form must be filed with the physics department course coordinator, 121 Clark Hall. Individual project work (reading or laboratory) in any branch of physics.

PHYS 500 Informal Graduate Laboratory
Fall, spring, summer. Variable to 2 credits. By permission of instructor. Experiments of widely varying difficulty in one or more areas, as listed under PHYS 510, may be done to fill special requirements. Fall, D. Hartill; spring, staff.

PHYS 510 Advanced Experimental Physics
Fall, spring. 3 credits. Lab. T W. An optional lecture associated with PHYS 410, M is available. Fall, D. Hartill; spring, staff.
About 60 different experiments are available in acoustics, optics, spectroscoopy, electrical circuits, electronics and ionics, magnetic resonance, X-rays, low temperature, solid state, cosmic rays, and nuclear physics.
Students perform three to four experiments selected to meet individual needs. Independent work is stressed. Lectures include techniques used in experiments in the advanced laboratory and on current research topics.
PHYS 520 Projects in Experimental Physics
Fall, spring, summer. Variable to 3 credits. To be supervised by faculty member. Students must advise department course coordinator of faculty member responsible for their project. Prerequisite: PHYS 510. Projects of interest that involve some independent development work by student. Opportunity for more initiative in experimental work than is possible in PHYS 510.

PHYS 525 Physics of Black Holes, White Dwarfs, and Neutron Stars (also ASTRO 511)
Spring. 4 credits. No astronomy or general relativity prerequisites. D. Lai.
This course covers the formation of compact objects: neutron and gravitational radiation from supernova collapse and neutron stars; equilibrium configurations, equations of state, stability criteria, and mass limits; the influence of rotation and magnetic fields, pulsar mass flow in binary systems; spherical and axisymmetric, high-temperature radiation processes, compact X-ray sources; Gamma-Ray bursts; and high-energy processes near supramassive blackholes, Quasars, and active galactic nuclei. Emphasis is on the application of fundamental physical principles to compact objects. Topics in diverse areas of physics are discussed, including solid-state physics, nuclear physics, relativity, fluid dynamics, and high-energy physics.

PHYS 551 Classical Mechanics, Nonlinear Dynamics, and Chaos (also PHYS 454)

PHYS 553-554 General Relativity (also ASTRO 509-510)
553, fall; 554, spring. 4 credits.
Prerequisite: knowledge of special relativity and methods of dynamics at the level of Classical Mechanics by Goldstein.
An introductory study of Einstein’s theory using methods of vector analysis, differential geometry, and tensor calculus. Topics include connections and curvature, equivalence principle, variational principle, electrodynamics, hydrodynamics, thermodynamics, statistical mechanics in the presence of gravitational fields, special relativity from the viewpoint of GR, GR as a dynamical theory, and experimental tests of GR. At the level of Gravitation by Misner, Thorne, and Wheeler and General Relativity by Wald. Hartle’s book Gravity: An Introduction to Einstein’s General Relativity may also be useful. PHYS 554 is a continuation of 553, which emphasizes applications to astrophysics and cosmology. Topics include gravitational collapse and black holes, gravitational waves, elementary cosmology, and the use of active gravitational dynamics as a fundamental element of astrophysical and cosmological research.

PHYS 561 Classical Electrodynamics
Fall. 3 credits. R. Talman.
Course covers Maxwell’s equations, electromagnetic potentials, electrodynamics of continuous media (selected topics), special relativity, and radiation theory. At the level of Classical Electrodynamics by Jackson.

PHYS 562 Statistical Physics
Spring. 4 credits. Primarily for graduate students. Prerequisites: a good knowledge of quantum mechanics, classical mechanics, and an undergraduate-level thermo-dynamics or statistical mechanics class will be expected. Lec. M W F. J. Sethna.
The course starts with the fundamental concepts of temperature, entropy, and free energy, defining the microcanonical, canonical, and grand canonical ensembles. We touch upon Markov chains, diffusion equations, and the fluctuation-dissipation theorem. We cover Bose-Einstein and Fermi statistics, black-body radiation, Bose condensation, superfluidity, metals, and white dwarfs. We discuss fundamental descriptions of phases, and introduce Landau theory, topological order parameters, and the homotopy classification of defects. We briefly study first order phase transitions and critical droplet theory and conclude with a discussion of critical phenomena, scaling, universality, and the renormalization group.

PHYS 572 Quantum Mechanics I
Fall. 4 credits. Lec. M W F. T. M. Yan.
Course 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 443 is assumed, but the course is self-contained.

PHYS 574 Applications of Quantum Mechanics II
Spring. 4 credits. Lec. M W F.
Possible topics include many electron atoms, second quantization, quantization of the electromagnetic field, scattering of complex systems, Bose-Einstein condensation of alkali atoms, superconductivity, and introduction to the Dirac equation. Knowledge of the concepts and techniques covered in PHYS 561 and 572 and of statistical mechanics at an undergraduate level is assumed.

PHYS 599 Cosmology (also ASTRO 599)
For description, see ASTRO 599.

PHYS 635 Solid-State Physics I
Fall. 3 credits. Prerequisite: a good undergraduate solid-state physics course, such as PHYS 454, as well as familiarity with graduate-level quantum mechanics. V. Ambegaokar.
A 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. At the level of Atomic and Electronic Structure of Solids by Kaxiras.

PHYS 636 Solid-State Physics II
Spring. 3 credits. Prerequisite: PHYS 635. P. Brouwer.
A continuation of PHYS 635. Topics from quantum condensed matter physics not included in that course. which may include Fermi Liquid Theory, magnetism, superconductivity, broken symmetries, elementary excitations and topological defects, superfluids, the quantum Hall effect, mesoscopic quantum transport theory, Anderson localization, and other metal insulator transitions.

PHYS 645 High-Energy Particle Physics

PHYS 646 High-Energy Particle Physics
Spring. 3 credits. Not offered 2004–2005. This course covers topics of current interest, such as high-energy electron and neutrino interactions, electron positron annihilation, and high-energy hadronic reactions.

PHYS 651 Relativistic Quantum Field Theory I
Fall. 3 credits. S-U grades only. M. Perelstein.
Topics include consequences of causality and Lorentz invariance, field quantization, perturbation theory, calculation of cross sections and decay rates, and an introduction to radiative corrections and renormalization with applications to electromagnetic and weak interactions.

PHYS 652 Relativistic Quantum Field Theory II
Spring. 3 credits. S-U grades only. H. Tye.
This course is a continuation of PHYS 651 and introduces more advanced methods and concepts in quantum field theory. Topics include renormalization, the renormalization group, non-abelian gauge theories, functional integral methods, and quantization of non-abelian gauge theories, the renormalization group, spontaneous symmetry breaking, and anomalies. At the level of An Introduction to Quantum Field Theory by Peskin and Schroeder.

PHYS 653 Statistical Physics
Fall. 3 credits. Prerequisites: competence in the basic principles of quantum mechanics, statistical physics at the level of PHYS 562, and thermodynamics. S-U grades only.
E. Mueller.
Survey of topics in modern statistical physics selected from dynamical statistical physics (kinetic theory, Boltzmann equation, hydrodynamics); theory of simple fluids; critical phenomena and the renormalization group; phase transitions in disordered systems; random matrix theory, and pattern formation in nonequilibrium systems.

PHYS 654 Theory of Many-Particle Systems
Spring. 3 credits. Prerequisites: PHYS 562, 574, 635, 636, and 653 or permission of instructor. S-U grades only. Staff.
Equilibrium and transport properties of microscopic systems of many particles. Formulas such as thermodynamic Green’s functions are introduced and applied to such topics as normal and superconducting Fermi systems, disordered metals, magnetism, dynamical impurity problems, and Luttinger Liquids.

PHYS 656 Introduction to Accelerator Physics and Technology (also PHYS 456)

PHYS 657 The Storage Ring as a Source of Synchrotron Radiation (also PHYS 457)
Not offered 2004–2005. For description, see PHYS 457.
PHYS 661 Advanced Topics in High-Energy Particle Theory
Fall. 3 credits. Prerequisites: PHYS 652. S-U grades only. H. Tye.
This course 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 and condensed matter physics, applications of the electroweak theory, lattice gauge theory, mathematical methods (e.g., group theory), perturbative quantum chromodynamics, anomalies and geometry, supersymmetry, current algebra, heavy quark physics, heavy quark symmetry, and phenomenological issues beyond the standard model.

PHYS 667 Theory of Stellar Structure and Evolution (also ASTRO 560)
For description, see ASTRO 560.

[PHYS 670 Instrumentation Seminar
Course covers conception, design, and performance of innovative instrumentation in condensed matter and elementary particle physics.]

PHYS 680 Computational Physics (also PHYS 480 and ASTRO 690)
For description, see PHYS 480.

PHYS 681-689 Special Topics
Offerings are announced each term. Typical topics are group theory, analyticity in particle physics, weak interactions, superfluids, stellar evolution, surface physics, Monte Carlo methods, low-temperature physics, magnetic resonance, phase transitions, and the renormalization group.

PHYS 681 Quantum Information Processing (also PHYS 481 and COM S 453)
For description, see PHYS 481.

PHYS 682 Computational Simulations
Fall. 4 credits. Enrollment may be limited. Labs T R afternoons. J. Sethna and C. Myers.
A graduate computer laboratory, focusing on the next generation of tools for computation, simulation, and research in a broad range of fields of interest to the IGERT program and the Life Sciences Initiative. The course will be pitched at a high level of computational sophistication, but will be designed to fit into the busy schedules of first-year graduate students.

[PHYS 687 Selected Topics in Accelerator Technology (also PHYS 487)
For description, see PHYS 487. Not offered 2004-2005.]

PHYS 688 Advanced Topics in Accelerator Physics (also PHYS 488)
Fall. 3 credits.
For description, see PHYS 488.

PHYS 690 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.

PHYSICS


The major areas of psychology represented in the department are perceptual and cognitive psychology, biopsychology, and personality and social psychology. These areas are 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 (such as 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. Admission to the major requires that students demonstrate a theoretical understanding of 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.)

Requirements for the major are:
1) a total of 40 credits in psychology (including prerequisites), from which students are expected to choose, in consultation with their advisors, a range of courses that covers the basic processes in psychology; and
2) a theoretical understanding of the basic processes in psychology (laboratory and/or field experience is recommended); and
3) Social, personality, and abnormal 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 and cognitive psychology:

2) Biopsychology:

3) Social, personality, and abnormal psychology:
   PHYS 128, 265, 275, 277, 280, 281, 325, 327, 328, 402, 404, 450, 481, 489, 491.

4) Other courses:
   PHYS 101, 199, 347, 350, 410, 440, 470, 471, 472, 473, 475, 478, 479. The major adviser determines to which group, if any, these courses may be applied.

With the permission of the adviser, 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 PHYS 350.
2) Passing an approved course or course sequence in statistics in some other department at Cornell. The approved list of courses and sequences may change. It has usually included SOC 301 and ILR 210 and 211. Requests that a particular course be added to this list may be made to Professor Gilovich.
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 six semester credits. The description of the course from the college catalog and the title and author of the textbook used must be submitted to Professor Gilovich for approval.
4) Passing an exemption examination. This examination can be given at virtually any time during the academic year if the student gives notice at least one week before. Students who have completed a theoretical statistics course in a department of mathematics or engineering and who wish to demonstrate competence in applied statistics usually find this option the easiest. Students planning this option should discuss it in advance with Professor Gilovich.
Concentration in biopsychology.

Psychology majors interested in psychology as a biological science can elect to specialize in biopsychology. Students in this concentration must meet all of the general requirements for the major in psychology and must also demonstrate a solid background in biology: the physical sciences, including at least introductory chemistry; and mathematics. Students will design with their advisers an integrated program in biopsychology built around courses on physiological, chemical, anatomical, and ecological determinants of human and nonhuman behavior offered by the Department of Psychology. Additional courses in physiology, anatomy, biochemistry, neurochemistry, neurobiology, and behavioral biology may be designated as part of the psychology major after consultation between the student and his or her biopsychology adviser.

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 background, students in the concentration will be permitted to include some major courses in sociology and related fields. Advisers will assist students in the selection of a coherent set of courses from social organization, cultural anthropology, experimental psychology, social methodology, and several aspects of personality and social psychology. Seniors in the concentration may elect advanced and graduate seminars, with the permission of the instructor.

Undergraduate honors program. The honors program is designed for those exceptionally able students who wish to pursue an intensive and independent program of research in psychology. Successful participation in this program serves as evidence of the student’s facility in the two most important skills of an academic psychologist: the capacity to acquire and integrate a substantial body of theoretical and factual material and the ability to engage in creative research activity. All qualified students are strongly encouraged to graduate with a degree in psychology or other academic fields should consider the honors program seriously. The program offers most students the closest contact and consultation with faculty members that they will receive during their time at Cornell.

The core of the honors program is a research project that the student carries out in close collaboration with a faculty member in the field of psychology. It is assumed that most students will do so while enrolled in PSYCH 470 (Undergraduate Research in Psychology). A written report of the research is to be given to the chair of the honors committee (currently Professor Owen) toward the end of the last semester of the student’s senior year. An oral defense of the thesis is then given before a committee of three faculty members, and the student presents his or her work in a public forum. Final honors standing (summa cum laude, magna cum laude, cum laude) is indicated on the student’s diploma. 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.

A student may formally apply to the honors program at any time during the senior year provided that she or he is actively engaged in independent research. However, students must do so by the second week of November. Applications should be given to Professor Owen and should be made directly by the student.

Distribution Requirement

The distribution requirement in the social sciences is satisfied by any two courses in social sciences; juniors and seniors not allowed. Not recommended for psychology majors; biology majors may not use the course for credit toward the major.

Note: if there should be changes in the days, times, or semester that a course is offered, we will post the necessary changes throughout the department and in the supplements of the Course and Time and Course and Room Rosters. Changes are also available on the web site, comp9.psych.cornell.edu.

Courses

PSYCH 101 Introduction to Psychology: The Frontiers of Psychological Inquiry (III) (SBA)
Fall, summer (6-week). 3 credits. Open to freshmen, sophomores, and juniors. Students who would like to take a discussion seminar should also enroll in PSYCH 103. M W F 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 several aspects of applied psychology. Emphasis is on developing skills to critically evaluate claims made about human behavior.

PSYCH 102 Introduction to Cognitive Science (also COGST 101, COM S 101, LING 170, PHIL 191) (III) (KCM)
Fall, summer (6-week). 3 or 4 credits (the 4-credit option includes a writing section instead of taking exams). T. R. M. Spivey.

This course surveys the study of how the mind works. We examine how intelligent information processing can arise from biological and artificial systems. The course 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 of the course 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.

PSYCH 103 Introductory Psychology Seminars
Fall. 1 credit. Limited to 500 students. Prerequisite: concurrent enrollment in PSYCH 101. 12 different time options.
J. B. Maas and staff.

A weekly seminar that may be taken in addition to PSYCH 101 to provide an in-depth exploration of selected areas in the field of psychology. Involves extensive discussion and a term paper related to the seminar topics. Choice of seminar topics and meeting times are available at the second lecture of PSYCH 101.

PSYCH 111 Brain, Mind, and Behavior (also BIONB 111 and COGST 111) (I) (PBS)
Spring. 3 credits. Letter grades only. No prerequisites. Intended for psychology majors. Not recommended for biology majors. Not recommended for biology majors; biology majors may not use the course for credit toward the major.

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?

PSYCH 201 Cognitive Science in Context Laboratory (also COGST 201 and COM S 201) (III) (KCM)


A laboratory course that explores the theories of cognitive science and provides direct experience with the techniques of cognitive science, in relation to the full range of both present and anticipated future activities in the workplace, the classroom, and everyday life. Discussions of laboratory exercise results, supplementation of laboratory topics, and analyses of challenging primary research literature are often done in meetings of the entire class. Laboratory exercises, which are done on an individual or small group basis, include both pre-planned investigations and student-developed experiments. Use of digital computers as well as the Internet, e-mail, and web sites are integral components of the course.

The focus is on human-computer interactions that are intended to permit effective and efficient exchange of information and control of functions or operations. This approach is applied to real life settings. Students are expected to attend each discussion meeting having read and thought about assigned materials, and to attend scheduled laboratory meetings fully prepared to perform the laboratory exercises. Laboratory facilities are available to students at all times so that statistical analysis of data, preparation of laboratory reports, and collection of experimental data is facilitated.

PSYCH 205 Perception (III)
Spring, 3 credits. Open to all students. Graduate students, see PSYCH 605. T. R. J. E. Cutting.

One of four introductory courses in cognitive psychology. Basic perceptual concepts and phenomena are discussed with emphasis on stimulus variables and sensory mechanisms. All sensory modalities are considered. Visual and auditory perception are discussed in detail.
PSYCH 209 Developmental Psychology (III) (KCM)
Spring. 4 credits. Graduates, see PSYCH 709 M. W. N. Nicastro.
One of four introductory courses in cognition and perception. A comprehensive introduction to current thinking and research in developmental psychology that addresses problems primarily from a cognitive perspective. The course focuses on the development of perception, action, cognition, language and social understanding in infancy and early childhood.

PSYCH 214 Cognitive Psychology (also COGST 214) (III) (KCM)
Fall. 3 credits. Sophomore standing required. Limited to 175 students. Graduate students, see PSYCH 614. M W F S. Edelman.
The course 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. Undergraduates who want 5 credits should enroll in PSYCH 214 and COGST 501.

PSYCH 215 Psychology of Language (also COGST 215, LING 215) (III) (KCM)
Spring. 3 credits. Limited to sophomores, juniors, and seniors. Prerequisites: any one course in psychology or human development. Graduate students, see PSYCH 715. T R. M. Christiansen.
This course provides an introduction to the psychology of language. The purpose of the course is to introduce students to the scientific study of psycholinguistic phenomena. It 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 222 Introduction to Biopsychology (II) (Supplementary list)
Fall. 3 credits. M W F 10-10. No prerequisites. Can be used to satisfy the psychology major breadth requirement and as an alternative prerequisite for upper-level biopsychology courses. M. J. Owen.
An introduction to psychology from a biological perspective, including both evolutionary and physiological approaches to behavior. Topics include the structure and function of the nervous system, genetic and biochemical models of behavior, hormones and behavior, biological bases of learning, cognition, communication, and language, and the evolution of social organization.

Introductory courses in social and personality psychology. Each of the following four courses (265, 275, 277, 280) provides an introduction to a major area of study within social and personality psychology. These courses are independent of one another and do not have any prerequisites. Students may take any one of the courses or any combination of them (including all four). Courses may be taken in any order or simultaneously.

PSYCH 231 Sophomore Seminar: Topics in Cognitive Studies: Mind and Reality in Science Fiction (also PSYCH 531, COGST 531)
Spring. 3 credits. Limited to 15 students. S. Edelman.
What does it mean to be a mind? How is a mind affected by its embodiment? By the body's immersion in the world? By not having a body in the first place, or not any longer? Is the world out there what it seems? Is there a world out there? Profound thinking about, and sometimes disturbing insights into, the nature of the human mind and its relationship to reality are found in the writings of a handful of visionaries (Phillip K. Dick, Ursula K. LeGuin, Greg Egan, and others) discussed in this course. The discussions are grouped into six themes: dreaming and reality, sanity and madness, self and others, sex and embodiment, death and immortality, and humanity and transhumanity.

This is a special seminar sponsored by the John S. Knight Institute's Sophomore Seminars Program. Seminars offer discipline-specific 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. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

PSYCH 265 Psychology and Law (III) (SBA)
Fall. 3 credits. M W F D. A. Dunning. This course examines the implications of psychological theory and methods for law and the criminal justice system. We concentrate 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 275 Introduction to Personality Psychology (also HD 260) (III) (SBA)
Spring. 3 credits. Limited. An introductory course in psychology or human development. T R. C. Hazan.
This course is designed as an introduction to the theory and research in the area of personality psychology, with special emphasis on personality development. It covers the major influences including genetic, environmental, and gene-environment interactions, and involves in-depth study of the major theories. The assumptions and models of human behavior that form the basis of each theoretical orientation are examined and compared, and the relevant empirical evidence reviewed and evaluated. In addition, basic principles and the methods for measuring and assessing personality are covered, as are the major related debates and controversies.

PSYCH 277 Social Construction of Gender (also FGSS 277) (III)
Fall. 3 credits. Limited to 180 students. T R. Not offered 2004-2005. J. F. Cutting. PSYCH/FGSS 277 is an interdisciplinary course that addresses two broad questions: How are an individual's gender and sexuality constructed? And how do hidden assumptions or "lenses" embedded in our social institutions, cultural discourses, and individual psyches perpetuate male power and oppress women and sexual minorities? Three lenses in particular are emphasized: androcentrism, gender polarization, and biological essentialism. A fundamental assumption of the course is that social science has worried too much about difference per se and too little about how even our most neutral-looking institutions invisibly transform difference into disadvantage. Although some attention is given to biological perspectives, the course emphasizes the cultural and psychological processes whereby the historically contingent comes to appear as the natural. Among the many topics discussed are the importance of looking at biology in context, the parental "instinct," androcentrism in law, sexual orientation cross-culturally, egalitarian relationships, gender-liberated child-rearing, and homophobia.

PSYCH 282 Community Outreach (also HD 282)
Fall. 2 credits. Prerequisites: PSYCH 101 or HD 115. T. H. Segal.
This course provides students with information and perspectives essential to volunteer fieldwork with human and social service programs in the community. To gain a practical understanding of what mental health professionals do in the workplace, students examine problems that emerge in fieldwork settings that raise ethical, methodological, theoretical, and practical issues in the observation or treatment of clients or patients. Although students are not required to volunteer at a local agency, the instructor will assist students in finding sites that may provide appropriate learning opportunities. A paper, relating current research to issues relevant to community mental health, is due at the end of the course.

PSYCH 292 Intelligence (III) (SBA)
A scientific overview of the controversial issues that surround intelligence tests and what they measure. Topics include the history of testing, correlates of test scores, alternative approaches to mental ability, genetic and environmental contributions to diversity in intelligence, effects of schooling, worldwide IQ gains, cultural factors, and group differences.

PSYCH 305 Visual Perception (also VISST 305) (III)
Fall. 4 credits. Limited to 25 students. Prerequisite: PSYCH 101 or permission of instructor. M. W. F. Not offered 2004-2005. J. F. Cutting.
A 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 311 Introduction to Human Memory (III)](III)
Spring. 3 credits. Limited to 40 students. Some familiarity with statistical methods and experimental design and with the study of cognition is desirable. Graduate students, see PSYCH 611. T. R. Not offered 2004–2005. Staff.

This course offers an overview of experimental findings and theoretical issues in the study of human memory. Coverage includes topics such as the nature of memory, various memory systems, coding and retrieval processes, practice and habit acquisition, encoding for learning and memory, interference and forgetting, models of memory, and memory dysfunction and its relation to normal memory.

[PSYCH 313 Problematic Behavior in Adolescence (also HD 313) (III)](III)

This course explores several problematic behaviors of adolescence, including depression, drug abuse, eating disorders, and delinquency. Various psychological, sociological, and biological explanations for the behaviors are presented. Appropriate research is reviewed; treatment and prevention strategies are explored. An optional discussion section is available to students who would like an opportunity to discuss readings and lectures in greater depth.

[PSYCH 316 Auditory Perception (III) (KCM)](III)
Fall. 3 or 4 credits; the 4-credit option involves a laboratory project or paper. Prerequisite: PSYCH 102, 205, 209, or 214 (other psychology, linguistics, or biology courses could serve as prerequisite with permission of the instructor). Limited to 30 students. Graduate students, see PSYCH 716. M. W. C. L. Krumhansl.

A course in children's auditory perception, including: (a) structure and function of the auditory system; (b) perceptual loudness, pitch, and spatial location, with applications to speech production and audition; and (c) environmental sounds.

[PSYCH 322 Hormones and Behavior (also BIONB 322) (I) (PBS)](I)
Fall. 3 credits. Two lectures plus a section in which students read and discuss original papers in the field, give an oral presentation, and write a term paper. Limited to juniors and seniors. Prerequisites: any one of the following: a) PSYCH 223, b) BIONB 221, c) PSYCH 222, or d) one year of introductory biology plus a course in psychology. Letter grade only. Graduate students see PSYCH 722. M. W. F. E. Adkins Regan.

Comparative and evolutionary approaches to the study of the relationship between reproductive hormones and sexual behavior in vertebrates, including humans. Also included are hormonal contributions to parental behavior, aggression, stress, learning and memory, and biological rhythms.

[PSYCH 324 Biopsychology Laboratory (also BIONB 324) (I) (PBS)](I)
Fall. 4 credits. Limited to 20 juniors and seniors. PSYCH 223 or BIONB 221 or 222, and permission of instructor. T. R. T. J. DeVoogd.

Experiments designed to provide experience in animal behavior (including learning) and its neural and hormonal mechanisms. A variety of techniques, animal species, and behavior patterns are included.

[PSYCH 325 Adult Psychopathology (also HD 370) (III)](III)
Spring, summer (3-week). 3 credits. Limited to sophomores, juniors, and seniors. Prerequisites: any one course in Psychology or Human Development. M. W. H. Segal.

A research-based introduction to the biological, psychological, and social (including cultural and historical) aspects of adult psychopathology. The major mental illnesses are covered, including (among others) schizophrenia, mood disorders, anxiety disorders, and personality disorders. Childhood disorders are not covered.

[PSYCH 326 Evolution of Human Behavior (I) (IPBS)](I)
Spring. 4 credits. Prerequisite: PSYCH 225, or an introductory biology course, or an introductory anthropological course. Graduate students, see PSYCH 526. T. R. Not offered 2005. R. E. Johnston.

A broad comparative approach to the evolution of humans and animals with special emphasis on the development of human behavior. Topics covered vary but include some of the following: human evolution, evolutionary and sociobiological theory, animal communication, nonverbal communication, language, cognitive capacities, social structure, and organization, cooperation and altruism, sexual behavior, mating and marriage systems, aggression, and warfare.

[PSYCH 327 Field Practicum I (also HD 327) (III) (SBA)](III)
Fall only. 3 credits. Prerequisites: PSYCH 325 or HD 370 (or taken concurrently), and permission of instructor. No S-U grades. Enrollment is limited. Enrolled students must commit to taking PSYCH 328 in the spring semester. No S-U option. M. W. H. Segal.

This course is composed of three components that form an intensive undergraduate field practicum. First, students spend three to six hours a week at local mental health agencies, schools, or nursing facilities working directly with children, adolescents, or adults; supervision is provided by host agency staff. Second, Cornell faculty provide additional weekly educational supervision for each student. Third, seminar meetings cover issues of adult and developmental psychopathology, clinical technique, case studies, and current research issues. Students write two short papers, two final take-home exams, and present an account of their field experience in class.

[PSYCH 328 Field Practicum II (also HD 328) (III) (SBA)](III)
Spring. 3 credits. Prerequisites: PSYCH 327 taken the previous term, PSYCH 325 or HD 370 (or taken concurrently), permission of instructor. No S-U grades. Enrollment is limited. M. W. H. Segal.

This course continues the field practicum experience from PSYCH 327. Students spend three to six hours a week at local mental health agencies, schools, or skilled nursing facilities working directly with children, adolescents, or adults; supervision is provided by host agency staff.

[PSYCH 330 Introduction to Computational Neuroscience (also BIONB 330 and COGST 330) (I) (PBS)](I)
Fall. 3 credits. Limited to 25 students. Prerequisites: BIONB 222 or permission of instructor. M. W. F. T. T. Tomsett.

This course covers the basic ideas and techniques involved in computational neuroscience. The course 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, and sensory coding.

[PSYCH 332 Biopsychology of Learning and Memory (also BIONB 332) (I) (PBS)](I)
Spring. 3 credits. Limited to 20 students. Prerequisites: any one course in psychology or human development. M. W. U. Neisser.

Much recent research has focused on people's ability to remember—and often to misremember—their own life experiences. This course will review that research, including such topics as "flashbulb" memories, "childhood amnesia," the development of memory in children, cultural differences, the "false memory syndrome," eyewitness testimony, prospective memory, sex differences, recall of school learning, the amnesic syndrome, and the relation between memory and self.

[PSYCH 342 Human Perception: Applications to Computer Graphics, Art, and Visual Display (also COGST 342 and VISST 342) (III)](III)
Fall. 3 or 4 credits. The 4-credit option involves a term paper. Prerequisite: PSYCH 101 or permission of instructor. PSYCH 205 strongly recommended. Graduate students, see PSYCH 642. T. R. D. J. Field.

Our present technology allows us to transmit and display information through a variety of media. To make the most of these media channels, it is important to consider the limitations and abilities of the human observer. The course considers a number of applied aspects of human perception with an emphasis on the display of visual information. Topics include "three-dimensional" display systems, color theory, spatial and temporal limitations of the visual systems, attempts at subliminal communication, and "visual" effects in film and television.
methods used to examine sensory systems are considered. Emphasis is on somesthetic, visual, and auditory systems. This course will be taught using the Socratic method, in which the instructor asks questions of the students. Students are encouraged to participate in the form of printed or electronic journal articles or reviews and are expected to come to each class having read, thought about, and prepared to discuss the assigned readings and other assigned information resources. A course packet of reproduced articles, textbooks, a course web site, and Internet sites are used. Students submit brief analyses of, and comments and questions on, all assignments by e-mail to the course's electronic mail list a day before each class meeting. The mailing list distributes submissions to all members of the class and to the instructor. In addition to these brief tri-weekly written exercises, a web site or a term paper on a topic germane to the course is required. All examinations are in take-home format. At the level of From Sound to Synapse by C. D. Geisler and The Retina by J. E. Dowling, courses.cit.cornell.edu/courses/psychabh_556c/.

**PSYCH 401 Theoretical Approaches to Psychopathology and Treatment (III)**

Fall. 3 credits. Limited to 20 students. Prerequisites: PSYCH 281 or 325. THA. Not offered 2004–2005. Staff.

**PSYCH 402 Current Research on Psychopathology: Depression (III)**

Spring. 4 credits. Limited to 20 students. Prerequisite: PSYCH 325 or HD 370 and permission of the instructor. M. Not offered 2004–2005. Staff.

Current research and theory on the nature and etiology of depression. Approaches from various perspectives (biological, psychological, sociocultural) are considered. Minimal attention given to psychotherapy and symptomatology.

**PSYCH 404 Psychopathology and the Family (III)**

Spring. 4 credits. Limited to 20 students. Prerequisite: PSYCH 325 or HD 370 and permission of the instructor. M. Not offered 2004–2005. Staff.

This course explores familial influences on the development of abnormal behavior. It examines how psychological, biological, and cultural factors in a family might contribute to such disorders as anorexia nervosa, depression, psychopathy, and psychosomatic illnesses. Emphasis is placed on early childhood experiences in the family and their impact on the development of later psychopathology. The course also discusses how the evolution of family structures in more recent times (e.g., the rise in day care and divorce) influences the individual. Family therapy approaches and techniques are also examined.

**PSYCH 405 Intuitive Judgment**

Fall. 4 credits. Limited to 18 students, by application. Senior psychology majors have priority. Prerequisites: at least one course in each of social and cognitive psychology. T. Gilovich.

Judgment pervades everyday experience. Can this person be trusted? Does this relationship have promise? Is the economy likely to flourish? This course will examine how people answer such questions by examining—in depth—classic and contemporary scholarship on the subject. Readings are mostly primary sources.

**PSYCH 410 Undergraduate Seminar in Psychology**

Fall or spring. 2 credits. Nonmajors may be admitted, but psychology majors are given priority. Staff.

Information on specific sections for each term, including instructor, prerequisites, and time and place, may be obtained from the Department of Psychology office, 211 Uris Hall.

**PSYCH 412 Laboratory in Cognition and Perception (III)**

Spring. 4 credits. Limited to 15 students. Prerequisite: student must have completed cognition or perception is recommended. Graduate students, see PSYCH 612. Not offered 2004–2005. M. W. D. J. Field.

A laboratory course is designed to introduce students to 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 the computer is not required. Projects are selected from the areas of visual perception, pattern recognition, memory, and concept learning.

**PSYCH 413 Information Processing: Conscious and Nonconscious (III)**

Spring. 4 credits. Prerequisites: at least 1 course in human experimental and perception of instructor, PSYCH 350 or equivalent will be useful for evaluating empirical articles. R. Not offered 2004–2005. Staff.

In the past decade, a not-so-quiet revolution has been taking place in the field of cognition regarding the problem of conscious mental computation. Data have come from patients with striking neuropsychological syndromes, i.e., the phenomenon of "blindsight" and the "amnesic" syndrome. This signature of independent mental computations has also been amply demonstrated in normal individuals in laboratory settings. We critically evaluate the theoretical worth and empirical justification of consciousness and between "conscious" and "nonconscious" mental computations in normal and patient populations. Weekly readings are from, but not limited to, topics such as visual processes, face recognition, explicit and implicit memory, language processing and social cognition. Students are required to: lead and partake in advanced level discussions of classic and current papers; submit weekly summaries of the assigned readings; write a term paper on a topic of their interest. Students should be prepared to read extensively.

**PSYCH 414 Comparative Cognition (also COGST 414) (III) (KCM)**

Spring. 3 or 4 credits. The 4-credit option involves an annotated bibliography or creating a relevant web site. Prerequisites: PSYCH 205, 209, 214, 223, 292 or permission of instructor. Graduate students, see PSYCH 714. T. R. M. J. Owren.

This course 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 415 Concepts, Categories, and Word Meanings (III)**

Fall. 4 credits. Prerequisites: PSYCH 205, 209, 214, or 215, or permission of instructor. Graduate students, see PSYCH 615. M. Staff.

A consideration of what categories are psychologically important, how they are represented and used through concepts, and how concept structure and semantic structure are interrelated. Different models of concept structure and categorization processes are evaluated, as are models of conceptual change and concept acquisition. Other topics include relations between concepts and broader knowledge-systems, such as scripts, mental models, and intuitive theories; relative roles of associative information and beliefs in concept structure; categorization in other species; neuropsychological studies of categorization; relations of categorization systems across cultures; and comparisons of concept structures across different categories.

**PSYCH 416 Modeling Perception and Cognition (also COGST 416) (III)**

Spring. 4 credits. Prerequisites: PSYCH 205, 209, 214, or 215, or permission of instructor. Graduate students, see PSYCH 616. M. W. F. M. Speyer.

This course offers a survey of several computational approaches to understanding perception and cognition. We explore linear systems analysis, connectionist networks, dynamical systems, and production systems, to name a few. Emphasis is placed on how complex sensory information gets represented in these models, as well as how it gets processed. This course covers computational accounts of sensory 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 417 The Origins of Thought and Knowledge (III)**

Fall. 4 credits. Prerequisite: permission of instructor. Graduate students, see PSYCH 717. M. W. Not offered 2004–2005. Staff.

An in-depth analysis of current theories concerning the growth of thought and knowledge in infancy and early childhood. This course addresses the following questions: How do infants come to understand the objects and events they experience? What are the best methods for assessing development of perception, cognition, and language? How do developing perceptual, cognitive, and language skills constrain object perception? What are the applications of research on early perception and language development to such fields as robotics and artificial intelligence?

**PSYCH 418 Psychology of Music (III) (KCM)**

Spring. 3 or 4 credits, depending on whether student elects to do an independent project. The course is intended for upper-level students in music, psychology, engineering, computer science, linguistics, physics, anthropology, biology, and related disciplines. Some music background is desirable but no specific musical skills are required. Graduate students, see PSYCH 618. M. W. F. C. L. Krumhansl.

A course that focuses on the major topics in the psychology of music: studied from a scientific perspective. It 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 419 Neural Networks Laboratory**

Spring. 4 credits. At least 1 course in biology or biological psychology. 1 year of calculus, and permission of instructor. Limited to 15 students. Graduate students, see PSYCH 619. T. R. Not offered 2004–2005. D. J. Field.

The core course that covers the major topics in the psychology of music: studied from a scientific perspective. It 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 420 Developmental Biopsychology (also BIONB 424) (I) (PBS)**

Spring. 4 credits. Prerequisites: BIONB 221 or 222 or BIOG 101–102 and permission of instructor. S-U grades optional. M W F; disc, 1 hour each week. Not offered 2004–2005. C. D. Hopkins.

Neuroethologists take a comparative and evolutionary approach to study the nervous system. They ask, how do brains of animals compare and how did they come about through the process of evolution? How are neural circuits adapted to species-typical behavior? What is the hope and interest in the study of a large diversity of animals, compared to a specialized look at just a few, that many other species? Can we hope to understand how animals with specialized behaviors have specialized nervous systems? What is the sensory world of a real animal and how does it vary from species to species? These and other questions drive this introductory survey of neuroethology: exotic senses; amazing motor programs; surprising integration.

**PSYCH 421 Cognitive Neuroscience (KCM)**

Fall. 4 credits. Prerequisites: a course in introductory biology and a course in biopsychology or neurobiology (such as PSYCH 223 or BIONB 221). Graduate students, see PSYCH 619. T. R. Not offered 2004–2005. D. J. Field.

The core course that covers the major topics in the psychology of music: studied from a scientific perspective. It 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 422 Developmental Biopsychology (also BIONB 424) (I) (PBS)**

Spring. 4 credits. Prerequisites: BIONB 221 or 222 or BIOG 101–102 and permission of instructor. S-U grades optional. M W F; disc, 1 hour each week. Not offered 2004–2005. C. D. Hopkins.

Neuroethologists take a comparative and evolutionary approach to study the nervous system. They ask, how do brains of animals compare and how did they come about through the process of evolution? How are neural circuits adapted to species-typical behavior? What is the hope and interest in the study of a large diversity of animals, compared to a specialized look at just a few, that many other species? Can we hope to understand how animals with specialized behaviors have specialized nervous systems? What is the sensory world of a real animal and how does it vary from species to species? These and other questions drive this introductory survey of neuroethology: exotic senses; amazing motor programs; surprising integration.

**PSYCH 425 Cognitive Neuroscience (KCM)**

Fall. 4 credits. Prerequisites: a course in introductory biology and a course in biopsychology or neurobiology (such as PSYCH 223 or BIONB 221); and an introductory course in cognitive science. Graduate students, see PSYCH 625. M W F. B. L. Finlay.

We study the relationship between structure and function in the central nervous system. The importance of evolutionary and mechanistic approaches for understanding the human behavior and cognition is stressed. The course focuses on cognitive neuroscience, including mechanisms of perception, particularly vision, and the neurophysiology of everyday acts involving complex cognitive skills such as recognition of individuals, navigation in the world, language, memory, social interaction, and consciousness.

**PSYCH 426 Evolution of Language (also COGST 427 and PSYCH 627)**

Fall. 3 credits. Limited to juniors and seniors. Prerequisite: any one course in psychology or human development. Graduate students see PSYCH 627. Offered alternate years. Not offered 2004–2005. M. Christiansen.

This seminar surveys a cross-section of modern theories, methods, and research pertaining to the origin and evolution of language. We consider the theoretical foundations of psychology, the cognitive neurosciences, comparative psychology, and computational modeling of evolution. Topics for discussion may include: What does the fossil record tell us about language evolution? How can we learn from comparative perspectives on neurobiology and behavior? Can apes really learn language? Did language come about through natural selection? What are the potential implications for language? What is the relationship between phylogeny and ontogeny?

**PSYCH 428 Connectionist Psycholinguistics (also COGST 428) (III)**

Fall. 3 credits. Seniors or permission of instructor. Graduate students see PSYCH 628. 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. In this course, we survey 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. We furthermore discuss the broader implications of connectionist models of language, not only for psycholinguistics, but also for computational and linguistic perspectives on language.

**PSYCH 429 Offal and Taste: Structure and Function (also BIONB 429) (II) (PBS)**

Spring. 3 or 4 credits (+4-credit option requires a term paper or web site). Limited to 35 students. Preference given to junior
and senior psychology or neurobiology or biology majors and graduate students. Prerequisite: one 300-level course in biopsychology or neurobiology or equivalent. Graduate students, see PSYCH 629. T. R. Not offered 2004-2005. B. P. Halpern.

The structural and functional characteristics of smelling and tasting are explored by reading and discussing current literature in these areas. Substantial use is made of online resources. For smelling, the main olfactory system and the trigeminal system are considered, and for relevant terrestrial vertebrates, both orthonasal and retro-nasal systems. In general, structure is examined at the gross, light and electron microscope, and molecular levels. Function includes odorant and tastant access, and neurophysiological, biochemical, and molecular genetic aspects. The emphasis is on vertebrates, especially air-breathing vertebrates in the case of smelling. Species-specific as well as general mechanisms are considered. Brief written responses (by e-mail) to questions and problems related to each set of assigned readings are required in advance of each class meeting and are automatically distributed to all members of the class. This course is taught using the Socratic Method, in which the instructor asks questions and students are expected to come to each class having already done and thought about the assigned readings, and to take an active part in every class. All examinations are take-home. At the level of Stevens' Handbook of Experimental Psychology: Vol. 1. Sensation and Perception (fourth edition, edited by H. Pschorr and S. Yantis; Handbook of Olfaction and Gustation (second edition, edited by R. L. Doty); Neurobiology of Taste and Smell (second edition, edited by T. E. Finger, W. L. Miller, and D. Restrepo); Smell and Taste in Health and Disease (edited by T. V. Getchell et al.); Mechanisms of Taste Transduction (edited by S. A. Simon and S. D. Roper); and Neuroscience (edited by D. Purves et al.)

PSYCH 431 Effects of Aging on Sensory and Perceptual Systems (also BIONB 421) (II) (PBS)

Fall. 3 or 4 credits. The 4-credit option involves a term paper or creation of a relevant web site. Limited to 35 students. Prerequisites: an introductory course in biology or psychology, plus a second course in perception, biopsychology, cognitive science, or biopsychology. T. R. Not offered 2004-2005. B. P. Halpern.

A literature-based examination of post-maturation changes in the perceptual, structural, and physiological characteristics of somesthetic, visual, auditory, and chemosensory systems. Emphasis is on human data, with nonhuman information included when especially relevant. Quality of life issues are included. Current developments in human sensory prosthetic devices, and in regeneration or replacement of receptor structures or organs are examined. Brief written statements by e-mail of questions and problems related to each set of assigned readings are required in advance of each class meeting and are automatically distributed to all members of the class. This course is taught using the Socratic Method, in which the instructor asks questions of the students. Students read, analyze, and discuss in class difficult original literature dealing with the subject matter of the course. Readings are from the Course Info site, courseinfo.cit.cornell.edu/courses/psych431_rhb421,f from Internet sites, from a course packet, and from materials ordered by the instructor. Students are expected to come to each class having already done and thought about the assigned readings, and to take an active part in every class. All examinations are take-home.

PSYCH 435 Olfaction, Pheromones, and Behavior (III)

Fall. 4 credits. Prerequisites: an introduction course in biology and one in neurobiology and behavior or biopsychology or a 300-level course in biopsychology or permission of instructor. R. M. Johnston.

This course covers chemical signals, olfaction, and behavior in vertebrates (including humans), as well as the neurobiology of olfaction and odor-mediated behaviors. Behavioral topics range from year to year but include evaluation of and advertisement for mates, aggression and territorial behavior, parental-young interactions, social recognition (species, sex, individual, kin reproductive status, status), and also covered, including the molecular biology of chemo-reception, olfactory coding, and higher-order processing in the central nervous system. The format includes lectures, discussions, and student presentations.

PSYCH 436 Language Development (also COGST 436, HD 436, and LING 436) (III) (KCM)

Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll under HD 635/LING 700/PSYCH 600, a supplemental graduate seminar. Prerequisite: at least 1 course in developmental psychology, cognitive psychology, cognitive development, or linguistics. S-U grades optional. T. R. B. Lust.

This course 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 450/LING 450 and PSYCH 457.)

PSYCH 437 Lab Course: Language Development (also COGST 450, HD 437, and LING 450) (in conjunction with COGST/MD/LING 436, Language Development)

Spring. 4 credits. R. B. Lust.

This laboratory course is an optional supplement to the survey course Language Development (HD/COGST/PSYCH/LING 436). The lab course provides students with a hands-on experience in scientific research, including design and methods, in the area of first-language acquisition.

PSYCH 440 The Brain and Sleep

Fall. 4 credits. Prerequisites: at least PSYCH 223 or BIONB 221. An additional course in biology, biopsychology, or neurobiology is recommended. S/U grades optional. Graduate students, see PSYCH 640. M. W. 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 possible role in learning and memory.

PSYCH 441 Laboratory in Sleep Research

Spring. 4 credits. Prerequisite: permission of the instructor during preregistration. Laboratory fee: $50. Graduate students, see PSYCH 641. W. H. S. Porte.

Emphasizing the neurobiology of sleep state, the 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 450 Gender and Clinical Psychology (also PSYCH 650, FGSS 450, FGSS 650) (III)

Fall. 4 credits. Limited to 15 juniors, seniors, and graduate students. Prerequisites: junior, senior or graduate standing and a prior course related to psychopathology and/or feminist analysis. Permission of instructor required through an application process during the preceding spring semester. Graduate students, see PSYCH 650/FGSS 650. Letter grades only.

This advanced undergraduate/graduate seminar explores feminist analyses of several interrelated topics at the intersection of clinical psychology, psychiatry and gender/sexuality. Topics include, among others, hysteria, borderline personality disorder, multiple-personality, anorexia, trauma, transsexuality, and homosexuality. Course requirements include weekly informal written commentaries on the readings, a final essay examination, and an in-class presentation on a self-selected topic.

PSYCH 452 Trauma and Treatment (also FGSS 452, FGSS 652, and PSYCH 652)

Spring. 4 credits. Limited to 15 seniors, with preference given to Psychology and Human Development majors. Prerequisites: previous course work in both psychopathology and social development and consent of instructor by written application. Letter grades only. S. Bem. An in-depth examination of psychological trauma and its treatment in psychotherapy. Special attention is given to the cultural history of trauma; trauma’s aftermath in dissociation and emotional regulation; the special case of child abuse and its effects
Advanced Courses and Seminars

Advanced seminars are primarily for graduate students, but with the permission of the instructor they may be taken by qualified undergraduates. The selection of seminars to be offered each term 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 Urs Hall). The following courses may be offered either term and carry 4 credits unless otherwise indicated.

PSYCH 510-511 Perception

PSYCH 512-514 Visual Perception

PSYCH 518 Topics in Psycholinguistics

PSYCH 519-520 Cognition

PSYCH 521 Psychobiology (Developmental Seminar)

PSYCH 522 Topics in Perception and Cognition

PSYCH 523 Hormones and Behavior

PSYCH 527 Topics in Biopsychology
and 1 course in nutrition. Undergraduate students may register with permission of instructor. S-U grades optional. Offered alternate years. T. R. D. A. Levitsky. This course is a multidisciplinary discussion of the causes, effects, and treatments of human obesity. Topics include the biopsychology of eating behavior, the genetics of obesity, the role of activity and energy metabolism, psychosocial determinants of obesity, anorexia nervosa, therapy and its effectiveness, and social discrimination.

PSYCH 614 Cognitive Psychology (also PSYCH 214) Fall. 4 credits. M. W. F. S. Edelman.


PSYCH 616 Modeling Perception and Cognition (also PSYCH 416 and COGST 416) Spring. 4 credits. M. Spivey.

PSYCH 618 Psychology of Music (also PSYCH 418) Fall. 4 credits. M. W. F. S. Edelman.

[PSYCH 619 Neural Networks Laboratory (also PSYCH 419) Fall. 4 credits. T. R. Not offered 2004–2005. J. Field.]


PSYCH 625 Cognitive Neuroscience (also PSYCH 425) Fall. 4 credits. M. W. F. Not offered 2005. B. L. Finlay.

PSYCH 626 Evolution of Human Behavior (also PSYCH 326) Spring. 4 credits. T. R. E. Johnston.

PSYCH 627 Evolution of Language (also COGST 427 and PSYCH 427) Fall. 4 credits. M. Christiansen.

PSYCH 628 Connectionist Psycholinguistics (also PSYCH 428) Fall. 4 credits. W. M. Christiansen.


PSYCH 631 Effects of Aging on Sensory and Perceptual Systems (also PSYCH 431 and BIONB 421) Fall. 4 credits. T. R. B. P. Halpern.

PSYCH 632 Biopsychology of Learning and Memory (also PSYCH 332 and BIONB 328) Spring. 4 credits. M. W. F. T. J. DeVoogd.

PSYCH 640 The Brain and Sleep (also PSYCH 440) Fall. 4 credits. M. W. H. S. Porte.

PSYCH 641 Laboratory in Sleep Research (also PSYCH 441) Spring. 4 credits. W. H. S. Porte.

The course emphasizes social cognition, but other topics, such as group dynamics, social influence, the social psychology of language, and emotional experience, are covered.

**PSYCH 776 Proseminar in Social Psychology II**

This is the second half of a yearlong discussion-seminar course intended to give graduate students an in-depth understanding of current research and theory in social psychology. The course emphasizes social cognition, but other topics, such as group dynamics, social influence, the social psychology of language, and emotional experience are covered.

**PSYCH 900 Doctoral Thesis Research in Biopsychology**

**PSYCH 910 Doctoral Thesis Research in Human Experimental Psychology**

**PSYCH 920 Doctoral Thesis Research in Social Psychology and Personality**

### Summer Session Courses

The following courses are also frequently offered in the summer session, though not necessarily by the same instructor as during the academic year. Not all of these courses are offered in a particular summer. Information regarding these courses and additional summer session offerings in psychology is available from the department before the end of the fall semester.

**PSYCH 101 Introduction to Psychology: The Frontiers of Psychological Inquiry**

**PSYCH 102 Introduction to Cognitive Science**

**PSYCH 128 Introduction to Psychology: Personality and Social Behavior**

**PSYCH 199 Sports Psychology**

**PSYCH 223 Introduction to Biopsychology**

**PSYCH 280 Introduction to Social Psychology**

**PSYCH 350 Statistics and Research Design**

### QUECHUA

See Romance Studies.

### RELIGIOUS STUDIES MAJOR


This is the second half of a yearlong discussion-seminar course intended to give graduate students an in-depth understanding of current research and theory in social psychology. The course emphasizes social cognition, but other topics, such as group dynamics, social influence, the social psychology of language, and emotional experience are covered.

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, with their individual, communal, and doctrinal dimensions, 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 prior to 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 your current Cornell transcript (the informal one you regularly receive is acceptable), please bring to your meeting with the director all of these forms, which are available in the Religious Studies office, 404 White Hall:
   a. a completed Religious Studies Major Application Form
   b. a proposed "Course of Study," which will be used as a guide in your conversation with the director and revised for formal submission to the program upon your entrance as a major.
   c. a College of Arts and Sciences Adviser/Major form, which will be signed by the director and your adviser. Your adviser will be assigned in your meeting with the director based on your interest.

**Advising in the Religious Studies Program:**

Upon entering the major in Religious Studies, a student is assigned a faculty adviser whose area of expertise most closely matches the proposed interest of the student. An up-to-date approved adviser list is available in the Religious Studies office. Please note that not all faculty members who cross-list courses with RELST can serve as RELST advisers.

Working closely with one's RELST adviser 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 250 Introduction to Asian Religions, RELST 251 Introduction to Judaism, Christianity, and Islam, and RELST 449 History and Methods of the Academic Study of Religion; and 2) complete with letter grades seven additional courses approved for the major, at least four of them at the 300 level or above. The following specifications of this second requirement are designed to promote breadth (2a) and depth (2b) of study.

(2a) At least four of a major's seven additional courses are to be selected to ensure some familiarity with two or more different religions, religious traditions, or religious phenomena. These courses may be at the introductory or advanced level. For example, Introduction to Asian Religions (RELST 250, also ASIAN 250) might lead a student to take Japanese Buddhism (RELST 359, also ASIAN 359), and then to combine these with two courses on Judaism. Introduction to Ancient Judaism (RELST 244, also NES 244/JWST 244) and Hebrew Bible and Arabic Qur'an in Comparative Perspective (RELST 299 also NES 299/JWST 299/COM L 299). Or a student might take four unrelated courses such as Introduction to Christian History (RELST 295 also NES 295/JWST 295/HIST 295), Religion and Reason (RELST 262 also PHIL 265), Myth, Ritual, and Symbol (RELST 320 also ANTH 320), and Muhammad and Mystics (RELST 254 also NES 250/COM L 250) to gain a sense of the range of intellectual activity associated with the academic study of religious traditions and religious practices.

(2b) At least two of these seven additional courses are to be selected to ensure depth of coverage in one religious tradition or group of closely related religions, religious traditions, or religious phenomena. In the first illustrative case described above, the student might combine Indian Religious Worlds (RELST 351 also ASIAN 351) with Tantric Traditions (RELST 347, also ASIAN 347) or Classical Indian Philosophical Systems (RELST 395 also ASIAN 395/CLASS 395) to acquire a measure of specialist strength in the religions of India. Alternatively, that student might combine Introduction to Ancient Religions with one or more courses dealing with Buddhism, such as Indian Buddhism (RELST 354/654 also ASIAN 354/354) or Theravada Buddhism (RELST 363 also ASIAN 363), to develop an appropriate depth along a different dimension.

No more than one of the courses chosen to meet requirement 2a may be used to satisfy 2b.

To engage in the kind of focused study envisioned under 2b, a student will be expected to attain proficieny in a language other than English to gain access to relevant sources, primary or secondary. For example, a knowledge of Greek or Latin might be required for the study of Christianity (as well as...
as Greek or Roman religions); of Hebrew or Aramaic for Judaism; of Arabic for Islam; of Sanskrit or Hindi for Hinduism; of Pali or Chinese for Buddhist studies.

Courses used to satisfy this foreign language proficiency requirement may not be applied to the course requirements described under 2a and 2b. Choice of language to fulfill this requirement is determined by the student in consultation with his or her adviser and is decided at the time the student enters the major.

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 offices 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 prior to commencement of final year.

2) Honors Courses. Candidates must sign into RELST 495 (Senior Honors Essay) for eight credits (two courses) for two semesters. After the first term, 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 eight credits. (The eight-credit limit is the result of the conviction/belief that earning more than eight 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 term of your junior year, or not later than Sept. 15 of the final year. She/he 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 adviser is on leave, the program will assign a committee member from the list of approved RELST advisers. 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/reader of the project is chair of the committee.

b) The student’s Religious Studies major adviser (required)

c) Another knowledgeable faculty member

Sometimes the adviser is the supervisor/reader. If that is the case, the student needs two additional knowledgeable professors for the committee of three.

Courses Approved for the Major Sponsored by Religious Studies

(RELST 123-124 Introduction to Biblical Hebrew I and II (also NES 123-124, JWST 123-124))

123, Fall; 124, Spring. 3 credits. Enrollment limited to 17 students. Not offered 2004–2005. Staff.

For description, see NES 123-124.

(RELST 131 Elementary Pali (also PALI 131-132))

Fall. 3 credits. Not offered 2004–2005. Staff.

For description, see PALI 131-132.

(RELST 133-134 Introduction to Qur’anic and Classical Arabic (also NES 133-134))


For description, see NES 133-134.

(RELST 211 Black Religious Traditions: Sacred and Secular (also AM ST 251 and HIST 211))

Fall. 4 credits. M. Washington.

For description, see HIST 211.

(RELST 212 Classical Arabic Texts (also NES 213))


For description, see NES 213.

(RELST 214 Qur’an and Commentary (also NES 214))

Spring. 3 credits. D. Powers.

For description, see NES 214.

(RELST 220 Buddhism in America (also ASIAN 220))


For description, see ASIAN 220.

(RELST 223 Introduction to the Bible (also NES 223, JWST 223))

Spring. 3 credits. E. Hamori.

For description, see NES 223.

(RELST 224 Introduction to the Bible (also NES 224, JWST 224))


For description, see NES 224.

(RELST 227 The Bible and Ancient Near Eastern Civilization (also NES 227, JWST 227, ARKEO 227))


For description, see NES 227.

(RELST 229 Introduction to the New Testament (also NES 229, JWST 229))


For description, see NES 229.

(RELST 230 Monuments of Medieval Art (also ART H 230))


For description, see ART H 230.

(RELST 237 Greek Religion and Mystery Cults (also CLASS 237))


For description, see CLASS 237.

(RELST 239 Cultural History of Jews of Spain (also NES 239, JWST 239, SPANL 239))

Fall. 3 credits. Staff.

For description, see NES 239.

(RELST 242 Religion and Politics in American History (also HIST 242, NES 242, AM ST 242))


For description, see HIST 242.

(RELST 244 Introduction to Ancient Judaism (also NES 244, JWST 244))

Fall. 3 credits. Not offered 2004–2005. Staff.

For description, see NES 244.

(RELST 250 Introduction to Asian Religions (also ASIAN 250))

Spring. 3 credits. D. Boucher.

For description, see ASIAN 250.

(RELST 251 Judaism, Christianity, and Islam (also NES 251, JWST 251))


For description, see NES 251.

(RELST 252 The Sufi Path: Mysticism in Islam (also NES 252))


For description, see NES 252.

(RELST 254 Muhammad and Mysticism in the Literatures of the Muslim World (also NES 250))


For description, see NES 250.

(RELST 255 Introduction to Islamic Civilization (also NES 255, HIST 253))

Spring. 3 credits. D. Powers.

For description, see NES 255.

(RELST 256 Introduction to the Qur’an (also NES 256, JWST 256))


For description, see NES 256.

(RELST 259 Islam in Theory and Practice (also NES 259))

Fall. 3 credits. S. Toorawa.

For description, see NES 259.

(RELST 261 Daily Life in the Biblical World (also ARKEO 260, JWST 262, and NES 262))

Spring. 3 credits. J. Zorn.

For description, see NES 262.

(RELST 262 Religion and Reason (also PHIL 263))

Spring. 4 credits. S. MacDonald.

For description, see PHIL 263.

(RELST 264 Introduction to Biblical History and Archaeology (also NES 263, JWST 263, ARKEO 263))


For description, see NES 263.

(RELST 265 The Middle Ages: An Introduction (also HIST 262))


For description, see HIST 262.

(RELST 266 Jerusalem Through the Ages (also NES 266, JWST 266))

Fall. 3 credits. J. Zorn.

For description, see NES 266.
RELST 277 Meditation in Indian Culture (also ASIAN 277)
Spring. 3 credits. D. Gold.
For description, see ASIAN 277.

RELST 290 Buddhism: A Survey (also ASIAN 299)
For description, see ASIAN 299.

RELST 295 Introduction to Christian History (also NES 295, JWST 295, HIST 299)
For description, see NES 295.

RELST 296 Jesus in History, Tradition, and the Cultural Imagination (also NES 296)
For description, see NES 296.

RELST 298 Issues in Catholic Thought (also NEANS 298)
Fall. 3 credits. J. Schuld.
For description, see NEANS 298.

RELST 299 The Hebrew Bible and the Arabic Qur'an in Comparative Perspective (also NES 299, JWST 299, COM L 299)
For description, see NES 299.

RELST 306 Zen Buddhism (also ASIAN 306)
For description, see ASIAN 306.

RELST 315 Medieval Philosophy (also PHIL 315)
Fall. 4 credits. S. MacDonald.
For description, see PHIL 315.

RELST 319 Spenser and Malory (also ENGL 321)
Fall. 4 credits. C. Kaske.
For description, see ENGL 321.

RELST 320 Myth, Ritual, and Symbol (also ANTHR 320)
Spring. 4 credits. A. Willford.
For description, see ANTHR 320.

RELST 321 Heresy and Orthodoxy in Early Christianity (also NES 321)
For description, see NES 321.

RELST 323 Reinventing Biblical Narrative Apocrypha and Pseudepigrapha (also NES 323, JWST 323)
For description, see NES 323.

RELST 326 Christianity and Judaism (also COM L 326)
For description, see COM L 326.

RELST 328 Literature of the Old Testament (also COM L 328)
Fall. 4 credits. C. Carmichael.
For description, see COM L 328.

RELST 329 Introduction to the New Testament Seminar (also NES 329, JWST 329)
For description, see NES 329.

RELST 330 Greek and Roman Mystery Cults and Early Christianity (also CLASS 333)
For description, see CLASS 333.

RELST 334 Islamic Spain: Culture and Society (also NES 339, JWST 339, COM L 334, SPAN L 339/639)
Fall. 4 credits. R. Brann.
For description, see NES 339.

RELST 341 Introduction to the History of Daoism (also ASIAN 343)
Spring. 3 credits. T. Hahn.
For description, see ASIAN 343.

RELST 345 Intellectual and Cultural Life of Nineteenth-Century Americans (also HIST 345, AM ST 345)
For description, see HIST 345.

RELST 347 Tantric Traditions (also ASIAN 347)
For description, see ASIAN 347.

RELST 348 Indian Devotional Poetry (also ASIAN 348)
For description, see ASIAN 348.

RELST 349 Modernization of the American Mind (also AM ST 346 and HIST 346)
Spring. 4 credits. R. Moore.
For description, see HIST 346.

RELST 350/651 Law, Society, and Culture (also NES 351/651, HIST 372/672)
For description, see NES 351/651.

RELST 351 Indian Religious Worlds (also ASIAN 351)
For description, see ASIAN 351.

RELST 354 Indian Buddhism (also RELST 654, ASIAN 354/654)
Fall. 4 credits. D. Boucher.
For description, see ASIAN 354/654.

RELST 355 Japanese Religions: A Study of Practice (also ASIAN 355)
For description, see ASIAN 355.

RELST 356 Islamic Law and Society (also NES 357)
For description, see NES 357.

RELST 357 Chinese Religions (also ASIAN 357)
For description, see ASIAN 357.

RELST 359 Japanese Buddhism (also ASIAN 359)
For description, see ASIAN 359.

RELST 366 Marriage and Sexuality in Medieval Europe (also HIST 368, FGSS 368)
Fall. 4 credits. P. Hyams.
For description, see HIST 368.

RELST 381 Anthropology and Religion (also ANTHR 381)
For description, see ANTHR 381.

RELST 390 Catholicism and Social Justice
Spring. 4 credits. J. Schuld.
For description, see NES 390.

RELST 393 Jews and Christians in the Modern Middle East (also NES 393)
For description, see NES 393.

RELST 394 Gender, Sexuality, and the Body in Early Christianity (also NES 394, FGSS 394)
For description, see NES 394.

RELST 395 Classical Indian Philosophical Systems (also ASIAN 395, CLASS 395)
For description, see ASIAN 395.

RELST 410 Latin Philosophical Texts (also PHIL 410)
Spring. Variable credit. Prerequisite: knowledge of Latin and permission of instructor. S. MacDonald.
For description, see PHIL 410.

RELST 412 The Classical in Colonial Asia (also S HUM 410)
Fall. 4 credits. A. Blackburn.
For description, see S HUM 410.

RELST 418 Seminar on Islamic History (also RELST 618, NES 418/618, HIST 461/671)
For description, see NES 418/618.

RELST 420 Readings in the Biblical Hebrew Prose (also NES 420)
Fall. 4 credits. E. Hamori.
For description, see NES 420.

RELST 421 Religious Reflections on the Human Body (also ASIAN 421)
For description, see ASIAN 421.

RELST 423 Readings in Biblical Hebrew Poetry (also NES 421, JWST 421)
For description, see NES 421.
RELS 424 The Hebrew Bible in the Middle Ages (also NES 424)
Spring. 4 credits. E. Altman.
For description, see NES 424.

[RELS 426 New Testament Seminar (also Co OL L 426)]
C. Carmichael.
For description, see COM L 426.

RELS 427 Biblical Seminar (also COM L 428)
Fall. 4 credits. C. Carmichael.
For description, see COM L 428.

[RELS 429 Adam's Rib and Other Divine Signs: Reading Biblical Narrative (also ENGL 429)]
L. Donaldson.
For description, see ENGL 429.

[RELS 430 Gnosticism and Early Christianity (also NES 428, JWST 428)]
K. Haines-Eitzen.
For description, see NES 428.

[RELS 438/638 Monks, Texts, and Relics (also ASIAN 438/638)]
A. Blackburn.
For description, see ASIAN 438.

RELS 441 Mahayana Buddhism (also ASIAN 441)
Spring. 4 credits. D. Boucher.
For description, see ASIAN 441.

[RELS 449 History and Methods of the Academic Study of Religion (also ASIAN 449)]
D. Boucher.
For description, see ASIAN 449.

[RELS 450 Rescreening the Holocaust (also THETR 450, GERST 449, COM L 453)]
Fall. 4 credits. Not offered 2004-2005.
D. Bathrick.
For description, see THETR 450.

RELS 460 Indian Meditation Texts (also ASIAN 460)
Fall. 4 credits. D. Gold.
For description, see ASIAN 460.

[RELS 462/662 Religion, Colonialism, and Nationalism in South and Southeast Asia (also ASIAN 462/662)]
A. Blackburn.
For description, see ASIAN 462.

RELS 490-491 Directed Study
490, fall; 491, spring. 2-4 credits each term.
For majors in Religious Studies, permission of director required. Staff.

RELS 495 Senior Honors Essay
Fall and spring. 2 semesters. 8 credits.
Required for honors in Religious Studies.
Staff.

RELS 497 Seminar: Religion and Bioethics (also NES 497)
Spring. 4 credits. J. Schuld.
For description, see NES 497.

[RELS 618 Seminar on Islamic History (also RELST 418, NES 418/618, HIST 461/671)]
D. Powers.
For description, see NES 618.

RELS 639 Islamic Spain: Culture and Society (also COM L 334, JWST 335, NES 339, RELST 334, SPANL 339, and SPANL 639)
Spring. 4 credits. R. Brann.
For description, see NES 339/639.

RELS 650 Seminar on Asian Religions (also ASIAN 650)
For description, see ASIAN 650.

RELS 654 Indian Buddhism (also RELST 354, ASIAN 354/654)
Fall. 3 credits. D. Boucher.
For description, see ASIAN 354/654.

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
(M. Greenberg, chair) offers courses in the following areas: French, Italian, and Spanish literature; Catalan, French, Italian, Portuguese, Quechua, and Spanish language; Francophone, Italian, and Hispanic culture; 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
Faculty: J. R. Resina
CATAL 121-122 Elementary Catalan
121. Fall, 122. Spring. 4 credits each term.
Catalan is a Romance language spoken by some 10 million people in four European states (Andorra, France, Italy, and Spain). Prior knowledge of another Romance language is not required. Foundations in French or in Spanish are helpful.

To complete the major, a student must:
1) Acquire advanced knowledge of and competence in the French language. This competence is demonstrated by the successful completion of FRROM 312 or its equivalent, such as properly accredited study abroad, or the passing of a special language test (the CASE examination), or the permission of the major advisor or of the director of undergraduate studies.
2) Take the three core courses for the major: FRRLIT 321 (Readings in Modern French Literature and Culture); FRRLIT 322 (Readings in Early Modern French Literature and Culture); FRRLIT 323 (Readings in Francophone Literature and Culture).
3) Take five more courses at the 300 level or above, at least three of which must be FRLIT courses. At least one of these courses must be on material created prior to the nineteenth century. The remaining two may be in related fields such as art history, comparative literature, government, history, linguistics, visual studies, women's studies, or another relevant discipline, only if there is a significant French component to the course.

French Cultural Studies
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 FRRLIT 221, and FRROM 219 or equivalent.

To complete the major, a student must:
1) Acquire advanced knowledge of and competence in the French language.
This competence is demonstrated by the successful completion of FRROM 312 or its equivalent, such as properly accredited study abroad or the passing of a special language test (the CASE examination) or the permission of the major advisor or of the director of undergraduate studies.

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 FRRLIT 221, and FRROM 219 or equivalent.

To complete the major, a student must:
2) Take the three core courses for the major: FRLIT 321 (Readings in Modern French Literature and Culture); FRLIT 322 (Renaissance in French Literature: The French Renaissance); and FRLIT 325 (Readings in Francophone Literatures and Cultures).

3) Take five more courses at the 300 level or above, in no more than three of any related discipline, as long as the course has a French component: art history, comparative literature, French literature, government, history, linguistics, visual studies, women’s studies, or any other relevant discipline. These courses must be approved by the major advisor or by the director of undergraduate studies, and must represent a coherent program with a clear focus.

Administration of French Area Studies

Students are admitted to the major by the director of undergraduate studies in the French section of the Department of Romance Studies but are guided by their individual advisers. A copy of each student's program is given to the director of undergraduate studies for approval and safe-keeping.

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 Departments of Romance Studies and Linguistics 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 FRROM 209 or its equivalent in advanced credit or placement by the Cornell CASE examination. The taking of FRROM 301 and/or 312 is, however, strongly recommended.

Students interested in studying in France are encouraged to consider the special benefits available to students who have previously studied French. Students who have previously studied French must have an LPF score lower than 56-64, or SAT II score of 600-660. Conducted in French. Recommended courses after FRROM 209: FRROM 219, FRLIT 220, or FRLIT 221. Tuition.

FRROM 219 French Intermediate Reading and Writing
Fall or spring. 3 credits. Provides language proficiency and satisfies Option I. Prerequisite: FRROM 123, LPF score of 56-64, or SAT II score of 600-660. Conducted in French. Recommended courses after FRROM 209: FRROM 219, FRLIT 220, or FRLIT 221. Tuition.

This 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.

FRROM 209 French Intermediate Composition and Conversation I
Fall, spring, or summer. 3 credits. Provides language proficiency and satisfies Option I. Prerequisite: FRLIT 123, LPF score of 56-64, or SAT II score of 600-660. Recommended courses after FRROM 209: FRROM 219, FRLIT 220, or FRLIT 221. Fall: C. Sparfel (course coordinator), C. Waldron, and staff; spring: C. Sparfel (course coordinator) and staff; summer: C. Waldron.

The course is designed to strengthen grammar skills, to improve reading, speaking, and writing ability, and to help students become independent learners.

FRROM 219 French Intermediate Composition and Conversation II
Fall or spring. 4 credits. Prerequisite: FRROM 209 or permission of instructor. Conducted in French. Recommended courses after FRROM 219: FRLIT 221, FRROM 301, or FRROM 305. FRROM 219 may be taken concurrently with FRLIT 221. Fall: S. L. Loher (course coordinator) and A. Cahn Fung; spring: A. Cahn Fung (course coordinator) and K. Proux.

The emphasis of this course is on improving grammatical accuracy and on enriching vocabulary in oral and written expression of French. Varied types of reading, including newspaper articles. Short videos, films, and presentations by students provide the basis
FRROM 300 Directed Studies
Fall or spring. 4 credits. Prerequisite: permission of instructor. Staff. Taught on a specialized basis to address particular student needs. Times arranged with instructor.

FRROM 301 Advanced French (I)
Fall or spring. 4 credits. Prerequisite: FRROM 219 or Q++ on the Cornell Advanced Standing Examination (CASE). Recommended courses after FRROM 301: FRROM 305 or FRLIT 220 or the FRLIT 221 may be taken concurrently with 301. S. LoBello and staff.
Class discussions based on reading contemporary texts: half short stories, half articles on current events taken from French magazines or newspapers. All texts are chosen for thematic or cultural interest and linguistic quality. Special attention is given to accuracy in French through grammar review and weekly papers (essays or translations). Each student gives one or more oral presentations in class. Course required of French majors.

FRROM 305 French through Film
Fall or spring. 4 credits. Prerequisite: Q++ on the Cornell Advanced Standing Examination (CASE), FRROM 219, or permission of instructor. Recommended courses after FRROM 305: FRROM 301 or 312. FRROM 305 may be taken concurrently with FRLIT 221. C. Waldron. Analysis of French contemporary films and related readings, used to study the language. Particular emphasis is on the culture and historical context as it relates to French contemporary society. Guest speakers provide enrichment on selected topics.

FRROM 312 Advanced French (II)
Fall or spring. 4 credits. Prerequisite: FRROM 301 or 305, or Q++ on the Cornell Advanced Standing Examination (CASE). 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 French. 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, precis, explication de texte, an exercice de style, and ibéme. Additional exercises will target vocabulary development. Seminar-style participation in class discussions is expected, as are two oral presentations.

FRROM 313 French in the News
Spring. 4 credits. Prerequisite: FRROM 301 or FRROM 305, or placement by the Cornell Advanced Standing Examination (CASE). T. Alkire.
The study of French televised news broadcasts and other media places students at the heart of today's France. A flexible approach allows students to perfect their language skills.

FRROM 315 Translating from French—Translating from Spanish (also COM L 314 and SPANR 315)
Fall. 4 credits. Prerequisite: FRROM 312 or SPANR 312 or permission of the instructor. J. Routier-Pucci.
This seminar-type course—open to students who have developed skill in two of the highest 300-level language courses offered in either Spanish or French—will focus on translating from the source language into the target language (i.e., English). The objective of the course is to learn and practice the skill of translating from one of the source languages into English, and in so doing, to investigate the various technical, stylistic, and cultural difficulties encountered in the process. To attain this objective, the students will be exposed to a series of translation tasks, conducted individually or in groups: they will be asked to justify their translations, compare different translations of the same passage, work on different types of texts, and edit each other's translations.

FRROM 320 Introduction to Twenty-First-Century France (IV) (LA)
Fall. 4 credits. Prerequisite: FRROM 221 or 224, and FRROM 301 or 305 or CASE placement. Conducted in French. P. Lewis.
The broad focus of this course will be the art, literature, culture, and society of contemporary France. These interlocking dimensions of what the French take to be their national identity will be examined through a wide variety of representations: descriptions published in newspapers, magazines, and scholarly journals of the social, political, and religious controversies that have been prominent since the spring 2003 elections; a sampling of narratives, theatre, poetry, and opera produced since 2000; documentary films and standard movies produced for mass consumption; publicity for museums, exhibitions, monuments, and urban organizations; essays by politicians, journalists, and scholars about the so-called “decline of France”, and conflicting accounts of France's place in the European Union and its tense relations with the United States.

FRROM 321 Readings in Modern French Literature and Culture (IV)
Fall or spring. 4 credits. Prerequisite: FRROM 221 or 224, and FRROM 301 or 305 or CASE placement. Conducted in French. A. Berger, staff.
This course is designed to teach ways of reading and understanding works created from the Romantic period to the present day, in their cultural contexts. A range of texts from various genres will be presented, and students will refine their analytical skills and their understanding of various methodologies of reading. Texts by authors such as Buzac, Baudelaire, Cixous, Colette, Duras, Genet, Mallarme, Michaux, Proust, Rimbaud, Sartre, and Sartre.

FRRLIT 214 New York, Paris, Baghdad: Poetry of the City (also NES 314)
Spring. 4 credits. S. Younawa.
For description, see NES 314.

The aim of this course is threefold: to further students' understanding of the peculiarities of the French language; to further their understanding of literary writing (hence their reading ability); and to allow them to put these skills to the test by writing creatively themselves. We will read short pieces of literature, looking at the grammar, the rhetoric, the figures, and the rhythm—everything that produces a literary effect and a richness of meaning. Then students will write short pieces themselves, based on their linguistic discoveries and understanding of the literary process. Both the texts read and the texts produced weekly by the students will be subjected to commentary and careful scrutiny.

FRRLIT 322 Readings in Early Modern Literature and Culture (IV)
Spring. 4 credits. Prerequisite: FRRLIT 221 or 224, and FRRLIT 301 or 305 or CASE placement. Conducted in French. M. C. Vallios.
This course is designed to familiarize students with works from the Renaissance, the Classical period, and the Enlightenment, as well as with the cultural and historical context in which these texts were created, reflecting a dynamic period of significant change for France. We will study texts by such authors as Corneille, Diderot, de Lafayette, du Bellay, Marguerite de Navarre, Moliere, Montaigne, Pernault, Racine, Ronsard, and Rousseau.
FRLIT 323 Readings in Francophone Literatures and Cultures @ (IV)  
Fall. 4 credits. Prerequisite: FRLIT 221 or 224, and FRROM 301 or 305 or CASE placement. Conducted in French. J. Coursil.  
This course is designed to enrich students’ knowledge of the Francophone literatures and cultures in their diversity and social and cultural complexity. Various works from France, West Africa, the Magreb, and the Caribbean Islands will be considered and various methodologies of analysis will be presented. The seminar will study works by such authors as Cheikh Amadou Kane, Amputé Bâ, Rachid Boudjedra, Aimé Césaire, René Depestre, and Raphaël Confiant.

FRLIT 334 The Novel as Masterwork [also FRLIT 684] # (IV) (LA)  
Spring. 4 credits. Conducted in French. Prerequisites: FRLIT 321, 322, 323, FRROM 301 or 305, or CASE placement, or permission of instructor. N. Furman.  
A study of three nineteenth-century novels by masters of the genre: Stendhal’s Le Rouge et le Noir, Flaubert’s Madame Bovary, and Zola’s Nana.

FRLIT 336 French Film (IV)  
Fall. 4 credits. Conducted in French. T. Murray.  
This course is a survey of major French films, and directors and trends in French film. Beginning with classic French films by directors such as Melies, Bresson, Carné, Vigo, Duvivier, and Renoir, we will consider the development of the New Wave (Truffaut, Godard, Rohmer, and Rivette), the Left Bank (Marker, Varda, and Resnais), and trends in post-68 and new media (Assayas, Kuntzel, Boissier, and Iam). Discussions of films will take into account the major critical and intellectual trends informing them, with particular emphasis on French film theory since 1968. Weekly screenings will be in French with English subtitles (required screenings on Monday evening TBA); papers in French or English.

FRLIT 341 Empire and Decolonization in Francophone Literature (IV) (LA)  
Spring. 4 credits. Conducted in French. Prerequisites: FRLIT 321, 322, 323, and FRROM 301 or 305, or CASE placement, or permission of instructor. J. Coursil.  
The course is a broad survey of the history of the French empire as it is shown and criticized in major postcolonial texts (novels, poems, theatre, and essays), by writers from West Africa, the Magreb, Madagascar, the Antilles, and France. The course is an introduction to the most important issues of the field, colonial wars, slavery, racism, negritude, revolutions, decolonization, and identities. We will also discuss the relevance of these questions with regard to the current phenomenon of globalization.

FRLIT 344 Introduction to Psychoanalysis (IV) (KCM)  
Spring. 4 credits. Conducted in English. T. McNulty.  
This course will provide an introduction to key concepts of psychoanalysis (the death drive, repression, the unconscious, the fantasy, and of transferance) as they are elaborated in the work of Sigmund Freud, especially as they help to elucidate questions of sexuality (infantile sexuality, the phallic and sexual difference, and masculinity and femininity) and the different logics and stakes of the three psychic structures (neurosis, psychosis, and perversion). We will also examine Freud’s cultural criticism (on totalitarianism, group psychology, and war), as well as work by subsequent psychoanalysts (especially Jacques Lacan) on language and sexual difference.

FRLIT 355 He Said, She Said: The Battle of the Sexes in Medieval Renaissance Writing [also FGSS 356 and ITALL 353]  
Spring. 4 credits. Conducted in English. K. P. Long and M. Migiel.  
The Middle Ages and the Renaissance have been described by some modern scholars as the crucible of modern subjectivity, the period in which we see the emergence of the “individual” and the elaboration of new and dissenting perspectives on the relation between the self and the divine, as well as between the self and the social order. Our seminar will focus upon these emerging perspectives by exploring how human experience has been articulated differently by men and women. Literary works of the period reveal a spirited debate about gender roles and notions of romantic love and sexuality. Gender, language, and power are enmeshed in these writings. Men and women wield words both to reinforce the status quo and to transform social reality, posing questions that continue to be asked today. Are men and women fundamentally different? Do they experience the same event in different ways? Do men acknowledge and respond to women’s experiences? Do women present themselves when they respond to male authority and assume authority themselves? We will look for answers to these questions in such works as the Letters of Heloise and Abelard, the Laís of Marie de France, Boccaccio’s Decameron, Marguerite de Navarre’s Heptameron, and poetry by Veronica Franco.

FRLIT 370 The French Enlightenment and the Modern Citizen # (IV) (CA)  
Fall. 4 credits. Conducted in French. Prerequisite: FRLIT 321, 322, 323, and FRROM 301 or 305, or CASE placement, or permission of instructor. M. C. Vallois.  
Through a reading of various works of the French eighteenth century (by Montesquieu, Voltaire, Diderot, and Rousseau, as well as other, less canonical authors), we will study the emergence of new literary discourses and practices aiming at a “secularization” of the literary field, in conjunction with the ideological and epistemological changes that took place under the name of “Enlightenment.” One of the most important of those changes is often seen as the production of the modern citizen.

FRLIT 372 Dandies in the Era of Decadence  
Spring. 4 credits. Conducted in French. Prerequisites: FRLIT 321, 322, 323, and FRROM 301 or 305, or CASE placement, or permission of instructor. N. Furman.  
A study of the dandy phenomenon and the concept of decadence in the later part of the nineteenth century. We will include Théophile Gautier’s Mademoiselle de Maupin, Barbet d’Aurevilly’s Les Diaboliques, Villiers de L’Isle-Adam’s Contes Crêtés, and J.-K. Huysmans’s A Rebours.

FRLIT 376 Classicism: Literature and Culture  
Spring. 4 credits. Prerequisites: FRLIT 321, 322, 323, and FRROM 301 or 305, or CASE placement, or permission of the instructor. P. Lewis.  
Properly entitled Art, Literature, Culture, and Propaganda in French Neo-Classicism, this course will examine three decades of cultural production—the 1660s, 1670s, and 1680s—in relation to the consolidation of the French monarchy under Louis XIV and the efforts of the state to direct artistic work toward the glorification of the monarchy. Much of the material we will study is by major authors such as Pascal, La Rochefoucauld, La Fontaine, La Bruyère, Madame de Lafayette, Madame de Sévigné, Saint-Simon, Boileau, Perrault, Lulli, and Fénelon—will provide a general introduction to French neo-classicism and its eventual contestation, as well as an account of the formation of a “world of letters” in Paris. The course will also include an overview of the moralists and their nuanced critiques of the social relations and political institutions that were being consolidated during this period.

FRLIT 382 Literature and Science in the Nineteenth Century # (IV)  
Fall. 4 credits. Conducted in French. Prerequisites: FRLIT 321, 322, 323, and FRROM 301 or 305, or CASE placement, or permission of the instructor. N. Furman.  
From medicine to physics, from biology to mechanics, the major scientific discoveries of the nineteenth century held the promise of either a better or a more hopeful future. Literature reflects these hopes and fears. We will be studying the nineteenth-century obsessive interest in science in the works of Balzac, Flaubert, Zola, Maupassant, Verne, and Villiers de l’Isle-Adam.

FRLIT 392 The Roots of Modernism  
Spring. 4 credits. Prerequisites: FRLIT 321, 322, 323, and FRROM 301 or 305, or CASE placement, or permission of the instructor. Conducted in French. R. Klein.  
The Modernist era in art, which is associated with movements such as Cubism, Surrealism, and Dada, has its roots in “the Banquet Years,” the effervescent fin de siècle in Europe that lasted until 1913. In France, the period includes writers like Jarry, Apollinaire, Gide, Valéry, Cocteau, Tzara, and Proust; composers such as Satie and Stravinsky; and artists like Cézanne and Rousseau. In this course, individual works will be examined with an eye to their role as precursors of more familiar recent forms of artistic expression.

FRLIT 411 Rousseau and Anthropology [also ANTHR 410]  
Fall. 4 credits. Conducted in English. A. Berger and J. Siegel.  
Levi-Strauss once wrote that Rousseau’s work laid the theoretical grounds for modern anthropology. Kant, a reader of Rousseau, coined the term “anthropology” at the end of the eighteenth century. Philosophers, scientists, and people of letters of that time all strived to produce a “knowledge of man” and to understand “human diversity.” They denounced “ethnocentrism” and reflected on differences. We will study proto-anthropological works of that period and ask in which ways Enlightenment thinking has influenced and continues to influence anthropology today. Readings may include Buffon, Diderot, Levi-Strauss, Mauss, and contemporary anthropologists.
FRLIT 412 Poetry and Poverty: Nineteenth-Century French Lyricism and the Times of Indigence (also FRLIT 617)

Spring. 4 credits. A. Berger.

From *Pauvres gens* (Hugo) to the "pauvre Leflan" (Verlaine), from Baudelaire's "poor" to Rimbaud's "poor," French poetry takes up the poor's claim. But poverty as a social phenomenon doesn't simply become a poetic theme by striking lyricism's sentimental chord. If poverty is the main issue of the century, as French nineteenth-century political and social thinkers agree, and if the question of the modern times is indeed the question of poverty ("la misère"), as Michelet and Heidegger suggest in various ways, then the logical treatment of poverty raises the question of poverty's relation to modernity, and more specifically to the economy that defines it. Through a close examination of poems by Hugo, Baudelaire, Rimbaud, Verlaine, Mallarmé, and Jahan-Bictus, read along with Michelet, Benjamin, and Heidegger (among others), we will address the question of poetry's relations to the modern experience of lack and need, as well as to the poor as a figure of the modern condition. How can poetry give (itself) and what can it give in times of want, that is in times of the retreat of the gift?

FRLIT 419-420 Special Topics in French Literature

419, fall; 420, spring. 2-4 credits each term. Prerequisite: permission of instructor. Staff.

Guided independent study of special topics.

FRLIT 429-430 Honors Work in French (IV)

429, fall; 430, spring. 8 credits (yearlong course). An R grade is given at the end of the fall semester and a final letter grade at the end of the spring semester. Open to juniors and seniors. Consult the director of the honors program for more information. M. C. Vallois.

FRLIT 438 Francophone Women Writers (also FRLIT 638)

Spring. 4 credits. Conducted in French. J. Coursil.

This course is designed to study works by women writers in relation with the postcolonial Francophone field. We will discuss questions such as artificial societies and democracy, sexuality in colonial contexts, post-colonial cultural identities, as well as racism and aesthetics of phenotypes. Texts by authors such as Mayotte Capcica, Maryse Condé, Simone Schwarz-Bart, Aminata Sow Fall, Leila Sebbar, and Helene Cixous. We will also study works from the works of Sigmund Freud, Simon de Beauvoir, Simone Weil, and others.

FRLIT 442 Sex in French (also FRLIT 642)

Spring. 4 credits. Prerequisites: FRLIT 221 or permission of instructor. Conducted in French, C. Howie.

Does a close investigation of French culture sustain its reputation for sexual provocation? From the medieval *guerelle de la rose* to the recent bestseller *La vie sexuelle de Catherine M.*, the boundaries between representing sex and philosophy are moving about: are they more or less constantly permeable? We'll look at a few particularly fraught moments in this history of permeability, beginning with the medieval dirty stories known as *fabliaux* and the debates that grew out of *Philosophie dans le boudoir*, Cocteau's *Le livre blanc*, Genet's *Miracle de la rose*, Bataille's *Erotisme*, Duras's *Les yeux bleus cheveux noirs*, and films by Patrice Chereau, Cyril Collard, Catherine Breillat, and Francois Ozon.

FRLIT 446 The Medieval Society of the Spectacle (also FRLIT 646 and ITALL 446/646)

Fall. 4 credits. Conducted in English, with bi-weekly discussion section in French and Italian for interested students. C. Howie. What does it mean to be dazzled? This course aims to explore some of the ways in which medieval France and Italy were the site of an exhaustion of the visible: in courtly and religious ritual; in theatrical display; in so-called mystical experience; and in reliquaries, cathedrals, and the bodies alleged to illuminate them from within. More specifically, does vision eclipse the other senses; does it eclipse interpretation; and what is at stake in the notion of eclipse? We will have ample opportunity to reflect upon both public and private modes of vision—that is, the spectacle as both mass spectacle and mirror—and to question the relationship of vision to the other senses, to language, to religion, to meaning. Our texts will come from a variety of genres, some historically more visible than others: from medieval French theatre (Adam de la Halle, Rutebeuf) to vernacular devotion (Marguerite Porete's *Les Amours*); and from letters (Catherine of Siena's letters); from the *Roman de la rose* and Dante's engagement with the political and psychic field of the visible; from Guy Debord to Kaja Silverman and Jean-Luc Nancy.

FRLIT 447 Medieval Literature # (IV) (LA)

Spring. 4 credits. Prerequisite: FRLIT 221 or permission of instructor. Conducted in English, C. Howie.

This course is designed to give students facility in reading Old French and an appreciation of two major genres of medieval French literature: the epic and the theatre.

FRLIT 451 Marguerite Duras (IV) (LA)

Spring. 4 credits. Prerequisite: FRLIT 220, 222, or permission of instructor. Conducted in French, T. McNulty.

This course will examine works representing the many different dimensions of Duras' oeuvre: novels, theatre, screenplays, films, and nonfiction. Our attention will focus on the problematic of time (memory and forgetting; narrative time; past, present, and future tenses); genre and media (why Duras so frequently retells the "same" story in a different medium or literary genre); politics (the French colonization of Indochina; the death camps of WW II and the French Resistance; the bombing of Hiroshima); and language and sexual difference (Duras' desire to reinvent literary form to tell the story of "the girl" and her interest in the political stakes of feminine speech). Our close readings of individual works will be complemented by critical essays by Blanchot, Cixous, Deleuze, Freud, Lacan, Heidegger, and others.

FRLIT 453 Ovid in the Renaissance (also FRLIT 653)

Fall. 4 credits. Conducted in French, K. Long.

Ovid, the Renaissance schoolboy's text of choice, offers a cornucopia of material on myths, monsters, heroes, transsexuals, and other wonders. This seminar will examine not only the significance of this material for the Renaissance imagination, but the importance of Ovid's work for notions of imitation and for the expression of broader philosophical

debates on the nature of knowledge, gender, and authority. Works to be read and discussed will include Ovid's *Metamorphoses*, Ronsard's *Amours*, Montaigne's *Essais*, D'Aubigné's *Les Tragiques*, and Pare's *Des Monstres et Prodiges*.

FRLIT 464 Oraity, Literature, Community (also FRLIT 664)

Spring. 4 credits. M. C. Vallois.

The goal of this course is to re-examine the question of the relationship between orality and literature in the production of French and Francophone cultures. We will look at this question in a cross-disciplinary perspective (linguistic, ethnological, philosophical, and historical), but the major focus of the course will be the close analysis of some emblematic examples that illustrate the problematic encounter of orality, literature, and community: medieval popular genres such as tales, proverbs, and songs; fairy tales and fables; dialogic and oratory texts, oraliterature... To do so we will read some of the major contributions on the subject by critical thinkers such as Zumthor, Jolles, Bakhtine, Derrida, de Certeau, and Glissant. Scoring among authorized texts and productions, we will evaluate the ways that centrality, erasure, marginalization, or idealization of the key notions of 

orality, community, and orality translate (or don't) a parallel movement in the modern, sexual, or national hierarchies of what is traditionally defined as French and Francophone culture.

FRLIT 607-608 Proseminar (also ITALL 607-608 and SPANL 607-608)

607, fall; 608, spring. 2 credits each term. M. Greenberg.

This proseminar is the place for sustained exchanges among graduate students, faculty members, and visiting lecturers. Activities include reading and discussion of seminal texts, chapters from dissertations and works-in-progress, and articles and essays from visiting lecturers.

FRLIT 611 Postcolonial Discourse Theory in Francophone Texts

Fall. 4 credits. J. Coursil.

Based on Francophone texts, both colonial and post-colonial, this course is designed as a discussion of different theoretical frameworks in contemporary critical discourse such as semiology, postmodernism, and deconstruction. We will focus on questions such as poetics and narrativity through works by Laureamont, Victor Ségalen, Aimé Césaire, Saint John Perse, Edouard Glissant, and others. The theoretical issues will be studied in authors such as Heidegger, Merleau-Ponty, Foucault, Barthes, Lyotard, Derrida, Saussure (new manuscripts), Benveniste, and Bakhtin.

FRLIT 617 Poetry and Poverty: Nineteenth-Century French Lyricism and the Times of Indigence (also FRLIT 412)

Spring. 4 credits. A. Berger.

For description, see FRLIT 412.

FRLIT 623 Althusser and Lacan (also COM L 686, GERST 686, and GOVT 675)

Fall. 4 credits. Reading knowledge of French not required. G. Waite.

This seminar takes up the old "dialogue" or "confrontation" between Marxism and psychoanalysis as it continues in our "postmodern" or "post-communist" era, based on close readings of selected works by Louis Althusser and by Jacques Lacan.
Specific topics include: the significance of their personal relationship; the role of "anti-philosophical" Lacanian concepts in Althusser's philosophy or "alacatory materialism"; writers of common interest (from Spinoza to Freud); the homology between the "return to Marx" and the "return to Freud"; their modes of interpretation and argumentation, the technique of "symptomatic reading"; differing concepts of "structure," "over determination," and "contradiction"; the question whether "ideology is (the) unconscious"; and their critiques of Marxism, Stalinism, and capitalism. Other writers include Badiou, Balibar, Butler, Cooper, Freud, Gramsci, Machiavelli, Marx, Mao, Negri, Spinoza, and Zizek.

**FRLIT 624 Psychoanalysis**
Spring. 4 credits. M. Greenberg. The class is intended to be an introduction for beginning graduate students to the history and theory of psychoanalysis. We will be primarily interested in reading the early texts of psychoanalysis, especially Freud, while indicating the different directions analytic theory and practice will take in their later developments.

**FRLIT 638 Francophone Women Writers (also FRLIT 438)**
Spring. 4 credits. Conducted in French. J. Coursil. For description, see FRLIT 438.

**FRLIT 639-640 Special Topics in French Literature**
639: fall; 640: spring. 2-4 credits each term. Staff. Guided independent study for graduate students.

**FRLIT 642 Sex in French (also FRLIT 442)**
Spring. 4 credits. Prerequisites: FRLIT 221 or permission of instructor. Conducted in French. C. Howie. For description, see FRLIT 442.

**FRLIT 646 The Medieval Society of the Spectacle (also FRLIT 446 and ITALL 446/464)**
Fall. 4 credits. C. Howie. For description, see FRLIT 446.

**FRLIT 653 Ovid in the Renaissance (also FRLIT 453)**
Fall. 4 credits. K. Long. For description, see FRLIT 453.

**FRLIT 664 Orality, Literature, Community (also FRLIT 464)**
Spring. 4 credits. M. C. Vallois. For description, see FRLIT 464.

**FRLIT 681 Femininity, Ethics, and Aesthetics (also COM L 679)**
Fall. 4 credits. Conducted in English. T. McNulty. This course will serve as a theoretical introduction to psychoanalytic treatments of femininity, especially in Freud and Lacan. The structure of femininity, distinct from biological sex or social gender, is understood as a particular status for the descriptive and to the signifier or law that seeks to limit its insistence. The first half of the course will explore the logic of femininity, its difference from masculinity, and its contestation of the phallic signifier. The second half will focus on the stakes of aesthetics in femininity, as a possible solution to the impasses of the signifier. We will examine other important formulations of femininity (Jones, Riviere, Klein, Montrelay), and its relation to aesthetics (Kant, Cixous, Lyotard), as well as works of fiction and visual art.

**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 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 acting director of undergraduate studies.

**Track 1: Italian Literature and Culture**
Track 1 of the major in Italian 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. Students who wish to major in Italian are advised to consult with the director of undergraduate studies, Timothy Campbell (tcc9@cornell.edu). Professor Campbell will take into account the student's interest, preparation, and career goals, will assign the student to an adviser. 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. With the major adviser, the student will craft an individualized plan of studies that will meet the minimum requirements for the major in Italian as listed here.

At least ten ITALL courses at the 200 level and higher. (The prerequisite may be counted toward this requirement. The 1-credit Italian praxis and the 2-credit independent-study options do not count as full courses.) One of these courses must be at the 400 level and one must be in the pre-eighteenth century. With permission of the adviser, the student may substitute for one of these courses others 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 in Italian. The Italian praxis may be used to fulfill three of these credits. Twelve of these credits must be in courses in Italian at the 300-level or above.

### Competency in the Italian Language
Students must demonstrate competency in the Italian language (as demonstrated by examination or by course work approved by the director of undergraduate studies).

**ITALA 402 History of the Italian Language** and **ITALA 403 Linguistic Structure of Italian** may be counted toward the ten courses required for the major. (Note: An introductory linguistics course is a prerequisite for ITALA 402 and 403.)

#### Track 2: Italian Studies
The Italian Studies option is designed primarily for students who wish to pursue individual interests that do not fall within the Italian option of the major. Students select courses from the Italian section 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 acting director of undergraduate studies.

**Admission:** By the end of their sophomore year, prospective majors in track 2 should have taken ITALL 219 (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 a successful completion of any ITALL course at the 200 level or higher conducted in Italian.
2. Complete the core series of Italian Studies courses: ITALL 290 (Perspectives in Italian Culture) or ITALL 295 (Italian Cinema) or ITALL 297 (Introduction to Italian Literature), and ITALL 298 (Special Topics in Italian Literature) or ITALL 313 (Advanced Conversation and Composition) or its equivalent.
3. Complete at least five courses (20 credits) from the approved list of Italian Studies courses at the 300 level from no more than three departments. Those students planning on studying abroad for a year or a semester in Italy should plan their course work to emphasize their individual interests.
4. Select a committee of one or more faculty advisers to help formulate a coherent program of study. One of the advisers must come from the Italian Studies section.

Students are encouraged to enrich the program by combining this option with other majors in related fields such as history of art, religious studies, music, comparative literature, or architecture.

#### Study Abroad in Italy
Italian Studies strongly encourages students to consider studying abroad in Italy, where 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 associate member. BCSP offers qualified undergraduate students an opportunity to study for credit for a full academic year or a second semester at the University of Bologna. During each semester of the academic year, which begins in October and extends through June, BCSP students enroll in one or two regular University of Bologna courses with Italian students. Students may also take special courses in...
Italian literature, language, art history, film studies, civilization, and contemporary politics.

Language
Enrollment in a language course is conditional upon the student's eligibility for the particular level and sequence of the first scheduled class session. Students who fail to attend the first three days of class will be automatically dropped from the course.

ITALA 121-122 Elementary Italian
121, fall; 122, spring. 4 credits each term. Prerequisite for ITALA 122: ITALA 121, or an LPI score of 37-44, or an SAT II score of 370-450. Intended for beginners or students placed by examination. At the end of ITALA 122, students who score lower than 56 on the LPI may take ITALA 123, while those with 56 or higher on the LPI qualify and may enter the 200-level sequence; otherwise ITALA 123 is required for qualification. Evening prelims. Fall: P. Cervesi (course coordinator), M. Baraldi, S. Stewart-Steinberg, P. Swenson, and staff; spring: F. Cervesi (course coordinator). M. Baraldi, S. Stewart-Steinberg, and staff. This course provides a thorough grounding in all the language skills: listening, speaking, reading, and writing, with practice in small groups. Lectures cover grammar and cultural information.

ITALA 123 Continuing Italian
Fall or spring. 4 credits. Provides language qualification. Limited to students who have previously studied Italian and have an LPI score of 45-55 or an SAT II score of 460-580. T. Alkire.

An all-skills course designed to improve speaking and reading ability, to establish groundwork for correct writing, and to provide a substantial grammar review.

ITALA 209 Italian Intermediate Composition and Conversation I
Fall or spring. 3 credits. Prerequisite: ITALA 123 or LPI score of 56-64, or SAT II score of 590-680, or CASE Q. Students wishing to major in Italian and students wishing to study abroad in Italy are strongly encouraged to take this course. Fall: K. Batig. Guided review of conversation, composition, reading, pronunciation, and grammar, emphasizing the development of accurate and idiomatic expression in the language. Spring: 3 credits. Prerequisite: ITALA 209 or equivalent. Students wishing to major in Italian and students wishing to study abroad in Italy are strongly encouraged to enroll concurrently in ITALL 214. K. Batig. A guided review of conversation, composition, reading, pronunciation, and grammar, and emphasis on the development of accurate and idiomatic expression in the language. Note: Students placed in 200-level courses also have the option of taking courses in introductory literature, cultural studies, and cinema. Separate listings under ITALL 214, 215, 216, and 217 for descriptions of these courses.

ITALA 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. Staff. Taught on a specialized basis to address particular student needs. Times are arranged with instructor.

ITALA 313 Advanced Conversation and Composition
Fall. 3 credits. Prerequisite: ITALA 219 or equivalent or permission of instructor. P. Swenson. Conducted in Italian, this course focuses on developing oral and written language skills through the study of cultural and social issues of contemporary Italy. Students will improve their fluency in the language through oral exercises, compositions, as well as group and individual presentations. The course will also entail a grammar review of selected points and analysis of present-day Italian.

ITALA 297 Introduction to Italian Literature
Fall. 3 credits. Conducted in Italian. Note: students who have taken ITALL 216 or 217 are not eligible to take this course. T. Campbell.

One of the "core courses" in the Italian Studies major, this course aims to introduce students to Italian literature of the twentieth century. The first half of the semester is dedicated to the short-story genre, in particular to prose works by Pirandello, Moravia, Buzzati, and Sciascia. In the second half, we will turn to the writings of Primo Levi, reading his classic Se questo è un uomo, as well as Carlo Levi's Christ and He Is Just Formed at Eboli. Throughout the course will be especially interested in the "Southern Question," the Shoah, and representations of life under fascism. In addition, the class includes significant practice in grammar and composition. To this end, the course includes a daily grammar component and students are required to write five papers of medium length over the course of the semester as well as take a final exam.

ITALA 300 Italian Practicum
Fall or spring. 1 credit. Conducted in Italian. Staff. Students enrolled in an Italian literature or culture course that is conducted in English (e.g., ITALL 221, 301, 351, 355, 446, and 456) may opt to take this one-credit practicum in Italian, provided that they have already completed the (CA) Literature. Students enrolled in an Italian literature or culture course that is conducted in English (e.g., ITALL 221, 301, 351, 355, 446, and 456) may opt to take this one-credit practicum in Italian, provided that they have already completed the practicum spend one class hour per week discussing selected issues or texts in Italian; they also complete an appropriate amount of written work in Italian.

ITALA 301 Screening "Cosa Nostra": The Mafia and the Movies from Scarface to The Sopranos
Spring. 4 credits. Conducted in English. T. Campbell.

From Al Capone to Tony Soprano, the mafia has been the subject of numerous films over the course of seventy years, so many in fact that one might well speak of a "mafia obsession" in American popular culture. Drawing upon a large number of American and Italian films, this course examines the cultural history of the mafia through film. We will explore issues related to the figure of the gangster, the gender and class assumptions that underpin it, and the portrayal—almost always stereotypical—of Italian-American immigrant experience that emerge from our viewings. The aim will be to enhance our understanding of the role the mafia plays in American and Italian culture in the twentieth and twenty-first centuries. Film screening will include Little Caesar, Scarface, Some of the Nation, The Godfather I and II, Goodfellas, The Funeral, Donnie Brasco, and episodes of The Sopranos. We will also watch a number of Italian treatments of the mafia: Excellent Cadavers, Salvatore Giuliano, Johnny Stecchino, and The 100 Steps, among others.
Readings from Leonardo Sciascia, Alexander Stille, and Regina Baracca will provide the necessary cultural and historical contexts.

ITAL 351 Machiavelli (also HIST 351) (III or IV)  
Spring. 4 credits. Conducted in English.  
J. Najemy.  
For description, see HIST 351.

ITAL 355 He Said, She Said: The Battle of the Sexes in Medieval and Renaissance Writing (also FGSS 356 and FRLIT 355)  
Spring. 4 credits. Conducted in English.  
M. Migiel and K. Long.  
The Middle Ages and the Renaissance have been described by some modern scholars as the crucible of modern subjectivity, the period in which we see the emergency of the "individual" and the elaboration of new and dissenting perspectives on the relation between the self and the divine, as well as between the self and the social order. Our seminar will focus upon these emerging perspectives by exploring how human experience has been articulated differently by men and women. Literary works of the period reveal a spirited debate about gender roles and notions of romantic love and sexuality. Gender, language and power are interwoven in these writings. Men and women wield words both to reinforce the status quo and to transform social reality, posing questions that continue to be asked today. Are men and women fundamentally different? Do they experience the same event in different ways? Do men acknowledge and respond to women's authority? How do women present themselves when they respond to male authority and assume authority themselves? We will look for answers to these questions in such works as the letters of Heloise and Abelard, the "Lais" of Marie de France, Boccaccio's Decameron, Marguerite de Navarre's Heptameron, and poetry by Veronica Franco.

ITAL 389 The Modern Novel: "Heroines, Their Authors, Their Critics" (also ITALL 689) (IV) (LA)  
Fall. 4 credits. S. Stewart-Steinberg.  
The modern Italian novels focused on in this course were all written in the nineteenth and early twentieth centuries, and they are constructed, but also how Italian literary or hysterics. In this course we analyze not only how and why such figures of woman reveal a spirited debate about gender roles and notions of romantic love and sexuality. Gender, language and power are interwoven in these writings. Men and women wield words both to reinforce the status quo and to transform social reality, posing questions that continue to be asked today. Are men and women fundamentally different? Do they experience the same event in different ways? Do men acknowledge and respond to women's authority? How do women present themselves when they respond to male authority and assume authority themselves? We will look for answers to these questions in such works as the letters of Heloise and Abelard, the "Lais" of Marie de France, Boccaccio's Decameron, Marguerite de Navarre's Heptameron, and poetry by Veronica Franco.

ITAL 429–430 Honors in Italian Literature  
429, fall; 430, spring. 8 credits (year-long course). An R grade is given at the end of the fall semester and a final letter grade at the end of the spring semester. Limited to seniors. Prerequisite: permission of instructor. T. Campbell and staff.

ITAL 445 Boccaccio  
Fall. 4 credits. Conducted in Italian.  
M. Migiel.  
This seminar will be dedicated to a reading of Boccaccio's Decameron (1349–51). Particular attention will be dedicated to exploring how the stories of the Decameron represent competing notions of love, marriage, sexuality, truth, and honor, as well as how the Decameron represents a world caught between aristocratic ideals and the interests of a new mercantile and business class.

ITAL 446 The Medieval Society of the Spectacle (also FRLIT 446, FRLIT 646, and ITALL 646)  
Fall. 4 credits. Conducted in English.  
C. Howie.  
For description, see FRLIT 446.

ITAL 456 Opera, History, Politics, and Gender (also COM L 459, FGSS 454, HIST 460, MUSIC 474, and S HUM 459) (II or IV)  
Fall. 4 credits. Conducted in English. S. Stewart-Steinberg and M. Steinberg.  
For description, see HIST 456.

ITAL 465 The Modern Post-Postmodernism in Italy (also ITALL 665) (IV)  
Spring. 4 credits. Conducted in Italian.  
T. Campbell.  
The subject of this seminar is the examination of postmodernism in the Italian and American contexts principally through the medium of narrative. Postmodernism is nominally an interdisciplinary phenomenon that skirts the fields of architecture, political economy, and literature, but as this seminar is offered under the heading of literature, the analyses are centered chiefly on Italian novels of the last twenty years that postmodernism forward as their theme. As such the course is embedded both in the discipline of Italian studies (for these novels are by their very nature representative of a certain literary genre well known in Italy) and in a critical discourse that goes by the name of theory. Students stand to gain much from such an alliance: greater familiarity with recent developments in narrative theory, a deeper understanding of the contemporary novel in Italy and the United States, and—most importantly—a sustained opportunity to think about and discuss issues that are absolutely central to informed judgments about contemporary aesthetics and cultural texts. Required texts include Jameson's Postmodernism, or The Cultural Logic of Late Capitalism, Nabokov's Pale Fire, Eco's The Name of the Rose, Tabucchi's The Missing Head of Damasceno Monteiro, Delillo's Libra, and Cabiao's Invisible Cities and If on a Winter's Night a Traveler.

ITAL 607–608 Proseminar (also FRLIT 607-608 and SPANL 607-608)  
607, fall; 608, spring. 2 credits each term.  
M. Greenberg.  
The proseminar is the place for sustained exchanges among students, faculty members, and visiting lecturers. Activities include reading and discussion of seminal texts, chapters from dissertations and works-in-progress, and articles and essays from visiting lecturers.

ITAL 639–640 Special Topics in Italian Literature  
639, fall; 640, spring. 4 credits each term.  
T. Campbell, M. Migiel, and S. Stewart-Steinberg.

ITAL 646 The Medieval Society of the Spectacle (also FRLIT 446, FRLIT 646, and ITALL 646)  
Fall. 4 credits. Conducted in English.  
C. Howie.  
For description, see FRLIT 446.

ITAL 665 The Modern Post-Postmodernism in Italy (also ITALL 465) (IV)  
Spring. 4 credits. Conducted in Italian.  
T. Campbell.  
For description, see ITALL 665.

Portuguese  
Faculty: J. Oliveira.

PORT 121–122 Elementary Brazilian Portuguese  
Fall. 4 credits each term.  
Intended for beginners, for students with little or no fluency in Spanish. Students may attain qualification upon completion of PORT 122 by achieving a satisfactory score on a special examination. J. Oliveira.  
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

PORT 209 Intermediate Conversation: Portuguese for Spanish Speakers @ Fall or spring. 3 credits. Provides language proficiency and satisfies Option 1.  
Prerequisites: PORT 122 or permission of instructor. J. Oliveira and staff.  
Intended for students who have taken PORT 121–122, and for students who are either native or near-native speakers of Spanish or another Romance language (or CAEd Q++). This fast-paced review is designed to improve grammatical accuracy and enrich vocabulary. An all-skills course, it incorporates listening comprehension and speaking activities, and particularly emphasizes Brazilian Portuguese as spoken within the context of its culture.

PORT 219 Intermediate Composition: Portuguese for Spanish Speakers @  
Spring. 3 credits. Prerequisite: PORT 209.  
J. Oliveira.  
This course further refines the development of accurate writing and oral expression. It provides a continuation of grammar review with special attention to pronunciation and the development of a more accurate, conversational, and colloquial communication of Brazilian Portuguese. It includes readings in contemporary Portuguese and Brazilian prose and some writing practice.

PORT 319 Readings in Luso-Brazilian Literature of the Nineteenth Century @ (IV)  
Fall. 4 credits. Prerequisite: permission of instructor. J. Oliveira.  
A broad approach to selected writings of representative Luso-Brazilian authors from the nineteenth century to the present, including Machado de Assis, Aluisio de Azevedo, Lima Breto, Manoel Antonio de Almeida, and Eca de Queiroz. The course is divided into small sections. The students may read all works either in Portuguese or in translation.
Assignments will include short book reports, and students will select a topic for in-depth research leading to the writing of a final term paper.

PORT 320 Readings in Luso-Brazilian Literature of the Twentieth Century
Spring. 4 credits. Prerequisite: permission of the instructor J. Oliveira.
A broad approach to selected writings of contemporary Brazilian and Portuguese authors such as Graciiliano Ramos, J. L. do Bogo, Jorge Amado, Clarice Lispector, Moacyr Scliar, Fernando Pessoa, and João Saramago. The course is divided into small sections. The students may read all works either in Portuguese or in translation.
Assignments will include short book reports, and students will select a topic for in-depth research leading to the writing of a final term paper.

PORT 630 Portuguese Reading for Graduates
Fall. 3 credits. Limited to graduate students. Staff.
Designed for those with little or no background in Portuguese and little exposure to written Portuguese, this course primarily aims to develop skill in reading Portuguese. Grammar basics, extensive vocabulary, and strategies for reading in a foreign language are covered. The choice of texts depends on the interest of the students in the course.

Quechua
Faculty: L. Morató-Peña.
QUECH 121-122 Elementary Quechua
121, fall; 122, spring. 4 credits each term. Prerequisite for 122: QUECH 121.
A beginning conversation course in Quechua.
QUECH 136 Quechua Writing Lab
Spring. 1 credit. Prerequisite: concurrent enrollment in QUECH 122 or instructor’s approval. Letter grade only. L. Morató-Peña.
Computer-assisted drill and writing instruction in elementary Quechua.
QUECH 209/219 Continuing Quechua @
209, fall; 219, spring. 3 credits each term. 209 provides language proficiency and satisfies Option I. Prerequisites: for QUECH 209: QUECH 122 or equivalent; for QUECH 219: QUECH 209 or equivalent. L. Morató-Peña.
An intermediate conversation and reading course. Study of the Huarochni manuscript.
QUECH 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. L. Morató-Peña.
Taught on a specialized basis to address particular student needs. Times arranged with instructor.

Romance Studies
ROM S 321 History of Romance Languages (also LING 321) # (III or IV) (HA)
Fall. 4 credits. C. Rosen.
For description, see LING 321.
ROM S 407 Methodology of Romance Language Learning and Teaching
Spring. 4 credits. J. Luks, N. Díaz-Inserré. This course, designed for the novice teacher in Romance languages, focuses on teaching as facilitation of learning, thus on the learner’s processing of language acquisition and the promotion of reflective teaching. A further objective is the development of an analytical grasp of the target languages, so that the novice teacher is better able to meet the needs of the learner in the understanding and acquisition of linguistic forms, notions, and functions. Pedagogical approaches are addressed from a learner-centered perspective involving effective language learning strategies and analysis.

ROM S 433 The Lesser-Known Romance Languages (also LING 433) (III)
(KCM)
Spring. 4 credits. Prerequisite: LING 101 or equivalent and qualification in any Romance language. C. Rosen.
The course surveys three or four Romance languages or dialects, examining their sound systems, grammars, and historical evolution from Latin. It includes some demonstrations by native speakers. Readings represent both the modern languages and their earliest attested stages. Topic for fall 2004: Catalan, Romanian, Northern Italian dialect, and a Rhotic-Romance Language.

Romance Languages Option

Spanish

The Major
The Spanish major is designed to give students proficiency in the oral and written language, to acquaint them with Hispanic culture, and to develop their skill in literary and linguistic analysis. Satisfactory completion of the major should enable students to meet language and literature requirements for teaching; to continue with graduate work in Spanish or other appropriate disciplines, and to satisfy standards for acceptance into the training programs of the government, social agencies, and business concerns. A Spanish major combined with another discipline may also allow a student to undertake preprofessional training for graduate study in law or medicine. Students interested in a Spanish major are encouraged to seek faculty advice as early as possible. For acceptance into the major, students should consult the director of undergraduate studies. Debra Castillo (dac9@cornell.edu), in 323D Morrill Hall. Professor Castillo will admit them to the major, and assign to them an advisor from the Spanish faculty, with whom they will work out a plan of study. Spanish majors have great flexibility in devising their programs of study and areas of concentration. Previous training and interests as well as vocational goals will be taken into account when the student’s program of courses is determined.

All tracks include the following core:
SPANL 218 and SPANR 219 (or equivalent) are prerequisite to entering the major in Spanish.

All majors will normally include the following core courses in their programs:
1) SPANR 310, 311, and 312 (two of these three courses)
2) SPANL 316, 318, and 319 (not necessarily in that order)

The Spanish Literature Option
The Spanish Literature Option normally includes at least 20 credits of SPANL beyond the core courses. Literature majors are strongly urged to include in their programs courses in all the major periods of Hispanic literature.

Spanish Language Option
The Spanish Language Option is a combination of literature and linguistics.

Area Studies Option (Spanish, Latin American, or U.S. Latino Studies)
At least 20 credits of courses at the 300 level and above in any of these 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, development sociology, and economics. Students who want to specialize in U.S. Latino issues are encouraged to include such topics as sociology of Latinos, Latino history, and Latino medical issues in addition to further studies in literature. Students planning on spending a year or semester in Seville (but not exclusively study Spanish) frequently plan their course work to emphasize Spanish history, art, political economy, and other related field courses, such as courses on Islam and Moorish 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.

Study Abroad in Spain: Cornell, the University of Michigan, and the University of Pennsylvania cosponsor 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 course work in Spanish language and culture and take advantage of special lectures and field trips in Andalucia. The College of Arts and Sciences awards 3 credits for orientation. Once the semester begins, students enroll in regular classes at the University of Seville and at the program's center in Seville. Center courses are designed for the program and include a seminar offered by the resident director, from the faculty of either Cornell, Michigan, or Pennsylvania. Other center courses typically include history of art, history of the Mediterranean region, a literature course, and Spanish composition and syntax. In Seville, students live in private homes and a rich array of cultural activities and excursions are organized every semester.

Applicants are expected to have at least completed SPA 112 prior to departure. Completion of SPA 112 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 the Cornell Abroad office in 474 Uris Hall and take a look at the Cornell Abroad Web site at www.cuabroad.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 members who participate in the program. In addition to course work on culture, politics, and social movements, the program features the opportunity to do intensive study in Quechua, the native language spoken by many Bolivians, as well as in Spanish, and to participate in research and internship with grassroots communities, government offices, and businesses.

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, upon a recommendation of the Spanish faculty to supervise their work and direct the writing of their honors essay (see SPANL 429–430).

Language
Enrollment in a language course is conditional upon the student's eligibility for the particular level and on attendance of the first scheduled class session. Students who fail to attend the first three days of class will be automatically dropped from the course.

All Spanish language courses are offered by the Department of Romance Studies, and Spanish linguistics courses are offered by the Department of Linguistics.

**SPANR 112 Elementary Spanish: Review and Stimulation**

Fall only. 4 credits. Prerequisite: LPS score of 37–44. S. Amigo-Silvestre (course coordinator) and staff.

This course is designed for students who have taken some Spanish and who have a placement score of 37–44 or SAT II score of 570–450. It provides a basic review and then moves on to cover new material for the remainder of the term. Students who have taken SPA 121 may enroll for this course as part of the final exam, students take the LPS and, according to their score, may place into SPA 123 (score below 56) or into the 200-level courses (score 56 or above).

**SPANR 121–122 Elementary Spanish 121, fall and summer; 122, spring: 4 credits each term. Prerequisite: for SPA 121: LPS score of 37–44 or SAT II score of 570–450. N. Díaz-Insensé (course coordinator) and staff.

This course is intended for students with no experience in Spanish. Students who are required to have prior knowledge of Spanish are not eligible for SPA 121 unless they have a LPS score lower than 37 or an SAT II score lower than 570. The course provides a thorough grounding in all language skills.

**SPANR 123 Continuing Spanish**

Fall, spring, or summer: 4 credits. Provides language proficiency and satisfies Option 1. Prerequisite: SPA 121 or LPS score of 45–55 or SAT II score of 460–580. Fall: M. K. Redmond (course coordinator), I. Morató-Peña, M. Scotto, and staff; spring: M. Redmond (course coordinator), S. Amigo-Silvestre, and I. Morató-Peña; summer: A. Stratakos-Tio. This is a lower-intermediate level course that provides an intensive grammar review in communicative contexts and practice in all skills. After this course, the student may take SPA 200, 207, or 209.

**SPANR 200 Spanish for English/ Spanish Bilinguals (also LSP 202)**

Fall or spring: 3 credits. Provides language proficiency and satisfies Option 1. Prerequisite: LPS score of 50 or higher, higher SAT II score of 590 or higher. CASE placement, permission of instructor, or permission of instructor. N. Maldonado-Méndez (course coordinator) and staff.

This is a course designed to expand bilingual students' knowledge of Spanish by providing them with ample opportunities to develop and improve each of the basic language skills. It is not available to students who have taken SPA 207 or 209.

**SPANR 207 Intermediate Spanish for the Medical and Health Professions**

Fall or spring: 3 credits. Provides language proficiency and satisfies Option 1. Prerequisite: SPA 123, LPS score of 56–64, or SAT II score of 590–680, or Q on CASE exam, or permission of instructor. Students who have taken SPA 200 or 209 should speak to the instructor. A. Stratakos-Tio.

This course provides a conventional grammar review, with dialogues, debates, compositions, and readings on health-related themes. Special attention is given to relevant cultural differences.

**SPANR 209 Spanish Intermediate Composition and Conversation I**

Fall or spring: 3 credits. Provides language proficiency and satisfies Option 1. Prerequisite: SPA 123, LPS score of 56–64, or SAT II score of 590–680. Not available to students who have taken SPA 207. Fall: J. Routier-Pucci (course coordinator), M. Blume, N. Maldonado-Méndez, P. Pérez del Solar, and staff; spring: N. Maldonado-Méndez (course coordinator), M. Blume, P. Pérez del Solar, M. Scotto, and staff.

This course provides a conversational grammar review with special attention to the development of accurate and idiomatic oral and written expression. Assignments include composition-writing, the reading and discussing of Spanish and Spanish American short stories and poetry, and the viewing of several films.

**SPANR 219 Spanish Intermediate Composition and Conversation II**

Fall or spring: 4 credits. Provides language proficiency and satisfies Option 1. Prerequisite: SPA 207 or 209, or CASE Q +. Fall: E. Dozier (course coordinator), Z. Iguita, and N. Maldonado-Méndez; spring: Z. Iguita (course coordinator) and E. Dozier.

This is an advanced-intermediate level course designed for students who want to further broaden their knowledge of the language and related cultures, as well as improve their comprehension and conversation skills.

**SPANR 300 Directed Study**

Fall or spring: 1–4 credits variable. Prerequisite: permission of instructor. Times to be arranged with instructor. Staff. Taught on a specialized basis to address particular student needs.

**SPANR 310 Advanced Spanish Conversation and Pronunciation**

Fall or spring: 3 credits. Prerequisite: SPA 219, or CASE Q++. A conversation course with intensive oral practice obtained through the production of video programs. Students practice the fundamental aspects of communication in standard Spanish and written Spanish, with some focus on dialectal variations. There are weekly pronunciation labs.
SPANR 311 Advanced Spanish Composition and Conversation I
Fall or spring. 4 credits. Prerequisite: SPANR 219, or CASE Q++, or equivalent. M. Stycos. Advanced language skills, developed through reading, grammar review, and intensive practice in speaking and writing. Analysis of present-day Spanish usage in a wide variety of oral and written texts.

SPANR 312 Advanced Spanish Composition and Conversation II
Fall or spring. 4 credits. Prerequisite: SPANR 311 or permission of instructor. M. Stycos. Readings and class discussion focus on the stylistic analysis of modern texts. Increased emphasis, through weekly essays, on students' development of an effective Spanish prose style.

SPANR 315 Translating from Spanish—Translating from French (also COM L 314 and FRROM 315)
Fall or spring. 4 credits. Prerequisite: FRROM 312, or SPANR 312, or permission of the instructor. J. Routier-Pucci. This seminar-type course, open to students who have successfully passed the highest 300-level language course offered in either Spanish or French, will focus on translating from the source language into the target language (i.e., English). The objective of the course is to learn and practice the skill of translating from one of the source languages into English, and in so doing, to investigate the various technical, stylistic, and cultural difficulties encountered in the process. To attain this objective, the students will be exposed to a series of translation tasks, conducted individually or in groups. They will be asked to justify their translations, compare different translations of the same passage, work on different types of texts, and edit each other's translations.

SPANR 630 Spanish for Reading
Spring. 3 credits. Limited to graduate students. J. Routier-Pucci. Designed for those with little or no background in Spanish and little exposure to written Spanish, this course primarily aims to develop skill in reading Spanish. Grammar basics, extensive vocabulary, and strategies for translating the foreign language are covered. The choice of texts depends on the interests of the students in the course.

Literature

SPANL 218 Introduction to Hispanic Literature @ (IV) (LA)
Fall or spring. 3 credits. Provides language proficiency and satisfies Option I. Prerequisite: SPAN 200, or 207, or 209, or CASE Q+. The course is divided into small sections and is taught mainly in Spanish. The literature course that normally follows SPANL 218 is either 316 or 318. C. Lawless and staff. An intermediate course designed to improve reading, writing, speaking, and comprehension skills in Spanish through the reading and discussion of contemporary literary works of various genres (narrative prose, drama, and poetry) from Spain and Spanish America. Emphasis is placed on the development of fluency in reading and of critical and analytical abilities. The cultural, sociological, and aesthetic implications of texts by authors such as Borges, Cortázar, Fuentes, García Márquez, García Lorca, and Cela are considered.

SPANL 239 Cultural History of the Jews of Spain (also COM L 239, JWST 239, NES 239, and RELST 239) @ (IV) (HA)
Fall. 4 credits. Conducted in English. E. Alfonso. For description, see NPS 239.

SPANL 246 Contemporary Narratives by Latina Writers (also FGSS 246 and LSP 246) (IV) (LA)
Fall. 3 credits. Conducted in English. L. Carrillo. This course offers a survey of narratives, including novels, short fiction, essays, political/feminist manifestoes, and memoirs by representative Latina writers of various Latino ethnic groups in the United States and the Americas, including Chicanas, Chicanos, Cubans, Dominicans, and Puerto Ricans. We investigate the parallel development of a Latina perspective on personal, social, and cultural issues alongside that of the U.S. ethnic liberation/revitalization movements of the 1960s through to contemporary feminist activism and women-of-color movements. We investigate these works as artistic attempts to deal with issues of culture, language and bilingualism, family, gender, sexuality, and domesticity. We account for regional distinctions and contributions. Readings include works by Julia Alvarez, Elena Castedo, Sandra Cisneros, Judith Ortiz Cofer, Cristina Garcia, and Ana Lydia Vega.

SPANL 248 Poetry of the Latino Experience
Spring. 3 credits. Conducted in English. L. Carrillo. This course offers a survey of the central importance of poetry in the modern and contemporary Latinx/a experience. Readings will chart and critique the developments beginning in the Civil Rights struggles during the 1960s among Chicanos/as in the West and Southwest United States and among Nuyorican writers in the East Coast through to the 1980s development of the Chicanx/a, Chicana, and gay poetry, and the Cuban poets emerging as the "American" generation; and concluding with recent poetry produced in the atmosphere of immigration, labor issues, globalization, and the institutional academy.

SPANL 301 Hispanic Theatre Production
Fall or spring. 1–2 credits. D. Castillo. Students in this course develop a specific dramatic text for full-scale production. They will select an appropriate play, closely analyze its literary aspects, and, as a group, evaluate its representational value and effectiveness. All students signing up for the course are involved in some aspect 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 fifty hours of work is required for 1 credit; a maximum of 2 credits will be awarded for 100 or more hours of work.

SPANL 303 After Immigration (also LSP 303) (IV)
Spring. 4 credits. D. Castillo. Beginning with a close reading of Michael Jones-Correa's Between Two Nations, we focus class discussion on recent Latin American immigration to the United States through two complementary perspectives and meditations on the immigrant experience: that of the individuals who have arrived in the U.S., and that of individuals who have chosen to remain in the countries of origin. The class covers films like Nuestra Yol, and works by Latin American authors like Carlos Fuentes, Ana Lydia Vega, and Ariel Dorfman; and U.S. Latinos like Julia Alvarez, Francisco Goldman, and Cristina Garcia. Students are encouraged to individually tailor their project that may include autobiographical or ethnographic elements as well as literary analysis and theoretical inquiries.

SPANR 313 Creative Writing Workshop
Spring. 4 credits. Prerequisite: SPANR 218, or SPANR 219, or CASE Q++, or permission of instructor. Conducted in Spanish. J. Routier-Pucci. Focused on the practice of narrative writing in Spanish. We will explore what makes a novel and a short story work, paying close attention to narrative structure, plot, beginnings/endings, character development, and theme. We will read classic novels and short stories as points of departure for the discussion. Since the course is a workshop, students are expected to write their own fiction.

SPANL 316 Readings in Modern Spanish American Literature @ (IV) (LA)
Fall or spring. 4 credits. Conducted in Spanish. Prerequisite: SPANR 218, and either SPANR 311, or placement by CASE exam, or permission of instructor. Fall: J. M. Rodríguez-García and M. Stycos; spring: C. Lawless and M. García. Readings and discussion of representative texts from Spain from the Romantic period to the present, including Bécquer, Galdós, Unamuno, García Lorca, and Cela.

SPANL 318 Readings in Modern Spanish American Literature @ (IV) (LA)
Fall or spring. 4 credits. Conducted in Spanish. Prerequisite: SPANR 218, and either SPANR 311, or placement by CASE exam, or permission of instructor. Fall: M. A. García; spring: C. Lawless and M. García. Readings and discussion of representative texts from Spain from the Romantic period to the present, including Bécquer, Galdós, Unamuno, García Lorca, and Cela.

Note: The prerequisites for the following courses, unless otherwise indicated, are SPANL 316 and 318 or permission of instructor.

SPANL 319 Renaissance Hispanisms @ (IV) (LA)
Fall or spring. 4 credits. Conducted in Spanish. Prerequisite: SPANL 316 and SPANL 318. SPANL 312 is recommended. Fall: S. Pinet; spring: M. A. García. In the study of Hispanic culture, 1492 works not only as the date of a watershed event but as cipher of the many discourses that came into conflict as the new continent was put on the map. The Golden Age will be addressed in this course from both sides of the Atlantic, setting out tendencies, continuities, conflicts, and ruptures. Readings may include texts by Columbus, Garcilaso, Cabeza de Vaca, Cervantes, Inca Garcilaso, Lope de Vega, Sor Juana, and Calderón.

SPANL 321 American Literature @ (IV) (LA)
Fall or spring. 4 credits. Conducted in Spanish. Prerequisite: SPANL 316 and SPANL 318. SPANR 200 is recommended. Fall: S. Pinet; spring: M. A. García. In the study of Hispanic culture, 1492 works not only as the date of a watershed event but as cipher of the many discourses that came into conflict as the new continent was put on the map. The Golden Age will be addressed in this course from both sides of the Atlantic, setting out tendencies, continuities, conflicts, and ruptures. Readings may include texts by Columbus, Garcilaso, Cabeza de Vaca, Cervantes, Inca Garcilaso, Lope de Vega, Sor Juana, and Calderón.
term “Golden Age.” There was a darker side to the Renaissance, however, that juxtaposed the conquest of America with the establishment of the Inquisition and the expulsion of Moors. The rise of the concept of Spain and its uniqueness and view it as a monument supreme representative of the continuous performance of cultural translations offered by late medieval Iberia. The seminar will be taught in conjunction with “Interrogating Iberian Frontiers: A Cross-Disciplinary Research Symposium on Medieval history, Religion, Art and Literature,” to be held at Cornell during the fall of 2004. Students will attend the symposium and participate in discussions, both organized and informal, with the speakers, including Dr. Díaz Jorge.

SPANL 419-420 Special Topics in Hispanic Literature
419, fall, 420, spring, 2-4 credits each term. Prerequisite: permission of instructor. Staff
Guided independent study of specific topics. For undergraduates interested in special problems not covered in courses.

SPANL 421 Spatial Histories of Latin America (also S HUM 419)
Spring. 4 credits. Limited to 15 students. R. Craib
This course examines the relationship between history and geography. It does so primarily by looking at how space is translated into text through acts of exploration, surveying, and map making in Latin America, from its geographical construction as part of a New World to the present. Readings are mostly secondary texts from history, literary criticism, anthropology, geography, and art history.

SPANL 422 Translating Tradition (also S HUM 423)
Spring. 4 credits. Limited to 15 students. J. Rodríguez-García
This seminar will examine the modernist articulation of orthodox and heterodox traditions following historicist patterns of flourishing and decay, and of precedent and return. We will focus on the two most influential poet-critics (T. S. Eliot and Octavio Paz) who have linked tradition with the translation or transfer of political and cultural authority from one nation to another. Secondary readings will include works by Benjamin, de Man, Kern禮, Said, Spivak, Bhabha, Clift, Ruma, G. Canclini, Bartra, Lefort, and Nancy.

SPANL 426 Colonialism and Modernity (also S HUM 426)
Spring. 4 credits. Limited to 15 students. J. Blanco.
This course investigates a series of political and literary fictions that produce the anomalous character of “colonial modernity”: the attempt to translate Western Enlightenment ideas of reason, freedom, and contract into the terms of colonial sovereignty, and the legacies of that project in the postcolonial era.

SPANL 429-430 Honors Work in Hispanic Literature
429, fall; 430, spring. 8 credits [yearlong course]. An R grade is given at the end of the fall semester fall and a final letter grade at the end of the spring semester. Limited to seniors with a superior academic record. Prerequisite: permission of instructor. D. Castillo and staff.

SPANL 441 Iberian Communities (also SPANL 641)
Fall. 4 credits. Prerequisite: SPANL 316 or permission of instructor. J. M. Rodríguez-García
This seminar is a survey of peninsular/Iberian poets, fiction writers, and cultural critics who...
based their work on ideas of community, tradition, and nationhood between about 1860 and 1900. Authors studied will include several Galician and Catalan poets who wrote in bilingual (Galician/Spanish, Catalan/Spanish) editions.

SPANL 455  Cervantes: Don Quijote (1605-2005) (also NES 455, NES 653, and SPANL 653) (IV)
Spring. 4 credits. Conducted in Spanish. Prerequisites: Any two of SPANL 316, 318, and 319; M. A. Garcés. The year 2005 marks the four-hundredth anniversary of the publication of Don Quijote. Cervantes's masterpiece lives on as a paradigm of creation. Don Quijote is not only "the first modern work of literature," as Foucault noted, but also "the first European novel," as hailed by the Czech novelist Kundera. In fact, Foucault believed that Cervantes's 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 construction of the self. The seminar will explore its creation within Cervantes's own creation, our and artistic production. Stressing a critique of the construction of the self, the seminar will focus on the origins of the modern concept of self, the construction of the self in modern society, and the construction of the self in the globalizing society of today.

SPANL 471  Virtual Embodiments: Spanish and Latin American Narrative of the 1990s
Fall. 4 credits. C. Hensler. As technology—telephone, computers, televisions—continues to isolate us, and as consumer culture increasingly replaces reality with an image, we find ourselves looking for our identities. Authors and characters of the novel of the 1990s fuse and confuse their identities with the commercial culture that surrounds them. The result is a neo-realism infused with virtual embodiment, a body (of narrative) contaminated by the influence of video clips, advertising, film, reality television shows, and cyberspace. In this class, the globalizing influence of the culture industry erases the transatlantic divide and allows for a simultaneous study of authors from the rich inter-American literature, including José Ángel Martías, Ray Loriga, Lucía Esteban Uría, Gabriela Bustelo, Andrés Neuman, and Alberto Fuguet. The objective is to study how commercial culture and technology contribute to the construction of contemporary identities inside and outside of the text. To this end, students will analyze novels, short stories, and academic articles; they will examine Web pages, book covers, book reviews, interviews, and promotional materials.

SPANL 605  Caribbean Urban Imaginaries
Fall. 4 credits. M. Garcia. Over the past several decades, increased critical attention has been paid to questions of space, and it has become an important focus within several academic disciplines. We are now witnessing the encounters between different cultures and the repercussions that these have on definitions of space and identity. More specifically, major metropolitan centers throughout the hemisphere are often studied as sites of development, hybridity, transgression, and transnationalism.

SPANL 607-608  Proseminar (also FRLIT 607-608 and ITALL 607-608)
Spring. 4 credits each term. 607; fall; 608; spring. 2 credits each term. Prerequisites: Any two of SPANL 316, 318, and 319. The proseminar is the place for sustained exchanges among graduate students, faculty members, and visiting lecturers. Activities include reading and discussion of seminal texts, chapters from dissertations and works-in-progress, and articles and essays from visiting lecturers.

SPANL 639-640  Special Topics in Hispanic Literature
639; fall; 640; spring. 2-4 credits each term. Staff.

SPANL 641  Iberian Communities (also SPANL 441)
Fall. 4 credits. J. M. Rodríguez-García. For description, see SPANL 441.

SPANL 647  Theory of the Novel
Fall. 4 credits. S. Pinet. This seminar will explore the beginnings of the genre of the novel through the genres of late medieval and early modern Spain—chivalric, sentimental, pastoral, and picaresque fiction—and the critique of theories of the novel.

SPANL 653  Cervantes: Don Quijote (1605-2005) (also NES 455, NES 653, and SPANL 455)
Spring. 4 credits. Conducted in Spanish. Prerequisites: Two of these three courses: SPANL 516, 518, and 519; M. A. Garcés. For description, see SPANL 455.

SPANL 657  Spanish Cinema
Spring. 4 credits. J. R. Resina. In this seminar, we will study the most salient instances of Spanish cinema since the 1930s, considering visual and narrative strategies of ideological production. The seminar will also serve as an introduction to the historical background of Francoism and the transition to democracy, considering such issues as the fictional and allegorical reconstruction of the past, the struggle around memory, and the promotion of a postmodern aesthetic as a vehicle for a historical break with the past.

SPANL 674  Contemporary Poetry and Poetics (also COM L 674 and ENGL 697)
Spring. 4 credits. J. Monroe. What gives contemporary poetry and poetics its resonance and value? What are its dominant features, audiences, and purposes? In the age of globalization and the World Wide Web, what has become of such familiar distinctions as the "traditional" and the "experimental," and the "mainstream" and the "alternative"? How does contemporary poetry situate itself among competing discourses (e.g., fiction, film, and electronic media)? How are we to understand its evolving public spheres and its relationship to the central cultural and historical developments of our time? With special attention to the period since 1989, this seminar will explore these and related questions in a range of works that open onto the rich field of contemporary poetry and poetics with issues concerning Bernstein, Kamau Brathwaite, Theresi Hak Kyung Cha, Joy Harjo, June Jordan, Willie Persono, Adrienne Rich, Juliana Spahr, Cecilia Vicuña, and Barrett Watten.

SPANL 697  Contemporary Poetry and Poetics
Spring. 4 credits. J. Monroe. What gives contemporary poetry and poetics its resonance and value? What are its dominant features, audiences, and purposes? In the age of globalization and the World Wide Web, what has become of such familiar distinctions as the "traditional" and the "experimental," and the "mainstream" and the "alternative"? How does contemporary poetry situate itself among competing discourses (e.g., fiction, film, and electronic media)? How are we to understand its evolving public spheres and its relationship to the central cultural and historical developments of our time? With special attention to the period since 1989, this seminar will explore these and related questions in a range of works that open onto the rich field of contemporary poetry and poetics with issues concerning Bernstein, Kamau Brathwaite, Theresi Hak Kyung Cha, Joy Harjo, June Jordan, Willie Persono, Adrienne Rich, Juliana Spahr, Cecilia Vicuña, and Barrett Watten.

SPANL 699  Topics in Spanish Literature and Culture
Spring. 4 credits. Conducted in Spanish. Prerequisites: Two of these three courses: SPANL 516, 518, and 519; M. A. Garcés. For description, see SPANL 455.

SPANL 747  Contemporary Poetry and Poetics
Fall. 4 credits. J. Monroe. What gives contemporary poetry and poetics its resonance and value? What are its dominant features, audiences, and purposes? In the age of globalization and the World Wide Web, what has become of such familiar distinctions as the "traditional" and the "experimental," and the "mainstream" and the "alternative"? How does contemporary poetry situate itself among competing discourses (e.g., fiction, film, and electronic media)? How are we to understand its evolving public spheres and its relationship to the central cultural and historical developments of our time? With special attention to the period since 1989, this seminar will explore these and related questions in a range of works that open onto the rich field of contemporary poetry and poetics with issues concerning Bernstein, Kamau Brathwaite, Theresi Hak Kyung Cha, Joy Harjo, June Jordan, Willie Persono, Adrienne Rich, Juliana Spahr, Cecilia Vicuña, and Barrett Watten.

RUSSIAN
N. Pollak, chair (226F Morrill Hall); P. Carden, director of undergraduate studies (on leave spring 2005) (226B Morrill Hall); S. Paperno, director of Russian language program (226E Morrill Hall); W. Browne, R. Krvavtsov, S. Senderwich (on leave fall 2004), G. Shapiro, V. Tsimberov. Visiting: K. Golkowska.

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 121-122, RUSSA 203-204, and RUSSL 209 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 122 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 303-304 or the equivalent, and 2) 18 credits from 300- and 400-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 one additional credit to certain literature courses by registering for RUSSA 491. Such courses involve a one-hour section each week with work in the Russian language. Students may count two one-hour credits toward the 12 hours of Russian literature in the original language required for the major.

Satisfying the Foreign Language Requirement
1) Under Options 1a and 1b: 1a) Any Russian language (RUSSA) course totaling 3 or 4 credits at the 200 level or above (with the exception of RUSSA 300 Directed Study) satisfies the Arts and Sciences language requirement under Option 1a.
1b) After completing the prerequisites RUSSA 121 and RUSSA 122, students may complete the language requirement by taking RUSSA 209 in the fall term. Students who qualify may satisfy the language requirement by taking RUSSL 212 in the spring term. Other Russian literature (RUSSL) courses that are taught in Russian may also be used when appropriate.

2) Under Option 2: 1. In two semesters: RUSSA 103 + RUSSA 121 in the fall, RUSSA 104 + RUSSA 122 in the spring.
2. In three semesters: RUSSA 121 in the fall, RUSSA 122 in the spring, RUSSA 203 the following fall.
3. In four semesters: RUSSA 121 in the fall, RUSSA 122 in the spring, RUSSA 125 the following fall, RUSSA 126 the following spring.

For updated information, consult our web sites:
literature) www.arts.cornell.edu/russian
(language) http://russian.cornell.edu
Study Abroad
Students from Cornell frequently participate in the Council on International Educational Exchange and the American Council of Teachers programs for language study, as well as other Russian language programs. Opportunities are available for study during the summer, a single semester, or the full year. Further information is available from Prof. Wayles Browne in the Department of Linguistics (220 Morrill Hall) and from the Cornell Abroad Office.

Honors
Students taking honors in Russian undertake individual reading and research and write an honors essay. Students planning to take honors should consult the director of undergraduate studies in their junior year.

Russian Language
Detailed information and schedules of the Russian language courses, as well as office hours of the instructors, are available at: http://russian.cornell.edu.

Suggested tracks for first- and second-year Russian language study:
• First-year intensive: 103 + 121 in the fall, 104 + 122 in the spring
• First-year non-intensive: 121 in the fall, 122 in the spring
• Second-year intensive: 125 + 203 in the fall, 126 + 204 in the spring
• Second-year non-intensive: 203 in the fall, 204 in the spring
• Second-year "mostly reading, lighter load": 125 in the fall, 126 in the spring

RUSSA 103-104 Conversation Practice
103, fall, 104, spring. 2 credits each term. Must enroll in one section of 103 and one section of 121 in the fall and one section of 104 and one section of 122 in the spring. M W 10:10-11:00. R. Krivitsky. The course reinforces the speaking skills learned in RUSSA 121 and 122. Homework includes assignments that must be done in the language lab or on the students' own computers.

RUSSA 121-122 Elementary Russian through Film
121, fall or summer; 122, spring or summer. 4 credits each term. Prerequisite: for RUSSA 122: completion of RUSSA 121. M T W R F 11:15-12:05 (section 1) or 12:20-1:10 (section 2). R. Krivitsky, S. Paperno, V. Tsimberov. A thorough grounding is given in all of the language skills: listening, 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 125-126 Reading Russian Press
125, fall; 126, spring. 2 credits each term. Section 1 is for non-native speakers of Russian; section 2 is for native speakers of Russian. Prerequisite for 125 section 1: RUSSA 122 or placement by the department; for 126 section 1: RUSSA 125 or placement by the department. Times to be arranged with instructors. Please see starred (*) note at the end of RUSSA section. S. Paperno, V. Tsimberov. The emphasis is on reading unadapted 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 203-204 Intermediate Composition and Conversation
203, fall; 204, spring. 3 credits each term. RUSSA 204 satisfies Option 1. Prerequisite for RUSSA 203: completing RUSSA 122 and RUSSA 104, or completing RUSSA 122 with a grade higher than B, or placement by department; for RUSSA 204: RUSSA 205 or equivalent. M T R F 1:25-2:15. R. Krivitsky, S. Paperno, 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.

RUSSA 300 Directed Studies
Full or spring. 1-4 credits variable. Prerequisite: permission of instructor. Times to be arranged with instructor. Please 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 303-304 Advanced Composition and Conversation
303, fall; 304, spring. 4 credits each term. RUSSA 304 satisfies Option 1. Prerequisite for RUSSA 303: RUSSA 204 or equivalent; for RUSSA 304: RUSSA 303 or equivalent. M W F 2:30-3:20. R. Krivitsky, S. Paperno, V. Tsimberov. Reading, writing, and conversation: current Russian films (feature and documentary), newspapers, TV programs, Russian web sites, and other materials are used. Completing interviews with native speakers of Russian is a component of RUSSA 304.

RUSSA 305-306 Reading and Writing for Heritage Speakers of Russian
305, fall; 306, spring. 2 credits each term. Prerequisite: placement by the department. Times to be arranged with instructor. Please see starred (*) note at end of RUSSA section. S. Paperno. This course is intended for students who speak Russian at home but have not learned to read or write grammatically correct Russian (or have not learned to write Russian at all). The syllabus may differ from year to year depending on the needs and interests of the students.

RUSSA 309-310 Advanced Reading
309, fall; 310, spring. 4 credits each term. Section 1 is for non-native speakers of Russian; section 2 is for native speakers of Russian. RUSSA 310 satisfies Option 1. Section 1 prerequisite for RUSSA 309: RUSSA 204; for RUSSA 310: RUSSA 309 or equivalent. Times to be arranged with instructors. Please see starred (*) note at end of RUSSA section. S. Paperno, V. Tsimberov. Course designed to teach advanced reading skills. In section 1, weekly reading assignments include 20-40 pages of unadapted 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 401-402 History of the Russian Language (also LING 417-418) (III) [KCM]
Fall and spring. 4 credits each term. Prerequisite for RUSSA 401: permission of instructor, for RUSSA 402: RUSSA 401 or equivalent. Offered alternate years. Times to be arranged with instructor. Please see double-starred (**) note at end of RUSSA section. W. Browne. Phonological, morphological, and syntactic developments from old Russian to modern Russian.

RUSSA 403-404 Linguistic Structure of Russian (also LING 443-444) (III) [KCM]
303, fall; 404, spring. 4 credits each term. Prerequisite for RUSSA 403: reading knowledge of Russian; for RUSSA 404: RUSSA 403 or equivalent. Offered alternate years. Times to be arranged with instructor. Please see double-starred (**) note at end of RUSSA section. W. Browne. A synchronic analysis of the structure of modern Russian. RUSSA 403 deals primarily with phonology and its relation to syntax and 404 with syntax and word order.

RUSSA 409 Teaching Russian as a Foreign Language
Fall or spring. 1 credit each term. Prerequisite: very good command of Russian language. Not offered 2004-2005. Times to be arranged with instructor. Please see starred (*) note at end of RUSSA section. S. Paperno. Designed to equip the teacher of Russian with the ability to practice language instruction in the classroom. Geared to the courses and methodology used in the Russian language program at Cornell. Not a theoretical course.

RUSSA 413-414 Advanced Conversation and Stylistics
413, fall; 414, spring. 2 credits each term. Prerequisite for RUSSA 413: RUSSA 304 or equivalent; for RUSSA 414: RUSSA 413 or equivalent. Times to be arranged with instructor. Please see starred (*) note at end of RUSSA section. V. Tsimberov. Discussion of authentic Russian texts and films (feature or documentary) in a variety of non-literary styles and genres.

RUSSA 491 Reading Course: Russian Literature in the Original Language
Fall or spring. 1 credit each term. Prerequisite: permission of instructor. Times to be arranged with instructor. Please see starred (*) note at end of RUSSA section. Staff. This course is to be taken in conjunction with any Russian literature course at the advanced level. Students receive one credit for reading and discussing works in Russian in addition to their normal course work.

RUSSA 601 Old Church Slavonic (also LING 661)
Fall. 4 credits. Prerequisite: students must know a Slavic or ancient Indo-European language. This course is a prerequisite for RUSSA 602 and offered alternate years. Times to be arranged with instructor. Please see double-starred (**) note at end of RUSSA section. Not offered 2004-2005. W. Browne. Grammar and reading of basic texts.
[RUSSA 602 Old Russian Texts (also LING 662)]
Spring. 4 credits. Prerequisite: RUSSA 601 or LING 661. Offered alternate years. Times to be arranged with instructor. Please see double-starred (**) note at end of RUSSA section. Not offered 2004-2005. W. Browne.
Grammatical analysis and close reading of Old Russian texts.

[RUSSA 633-634 Russian for Russian Specialists]
633, fall; 634, spring. 1-4 credits variable. Prerequisite: 4 years of college Russian or equivalent. For graduates and advanced undergraduates. Times to be arranged with instructor. Please see double-starred (**) note at end of RUSSA section. Section. Not offered 2004-2005. W. Browne.
The course is designed for students whose areas of study require advanced active and passive command of the language. Fine points of syntax, usage, and style are discussed and practiced.

[RUSSA 651-652] Comparative Slavic Linguistics (also LING 671-672)
651, spring; 652, spring. 4 credits each term. Prerequisite for RUSSA 651: RUSSA 601 taken previously or simultaneously, or permission of instructor; for RUSSA 652: RUSSA 633, spring; 634, spring. Offered alternate years. 652 not offered 2004-2005. Times to be arranged with instructor. Please see double-starred (**) note at end of RUSSA section. W. Browne.
Courses deal with various aspects of Russian culture: e.g., literature, art, music, religion, philosophy, and social thought. RUSSA 651 extends over the period from the beginning through the eighteenth century. RUSSA 652 covers the nineteenth and twentieth centuries. Russian culture is presented as part of Western civilization, with attention to its distinctive character. Basic texts are moderate-length literary works in English translation. Classes incorporate audiovisual presentations (slides, tapes, film).

[RUSSL 209 Readings in Russian Prose and Poetry (LA)]
Fall. 3 credits. Satisfies language Option I. M W F 11:45-12:35. G. Shapiro.
Short nineteenth- to early twentieth-century classics including Pushkin, Dostoevsky, Tolstoy, Blok, Pasternak (in Russian). Conducted in English. For students with 2+ semesters of Russian language (121,122, or equivalent). Assignments adjusted for native fluency. May be used as a prerequisite for RUSS 300-400 courses with reading in Russian.

[RUSSL 212 Readings in Twentieth-Century Russian Literature (IV) (LA)]
Course goals are to introduce students to twentieth-century Russian literature in the original and to improve their Russian reading and writing skills. Readings are from twentieth-century masters such as Bunin, Bulgakov, and Nabokov. All reading, writing, and discussion in Russian. Course designed for students with native background needing another course to satisfy the language requirement. May be used as a prerequisite for RUSS 300-400 courses with reading in Russian.

[RUSSL 233 Soviet Social and Family Life, WW II (also HIST 233) (III) (CA)]
For description, see HIST 233.

[RUSSL 279 The Russian Connection, 1830-1887 (also COM L 279) (IV) (LA)]
As Russian prose began to find its voice, it responded with enthusiasm to the European prose tradition. One line of development in the Russian novel began with Rousseau's division between the needs of individual growth, nourished by solitude and introspection, and the demands of society. Tolstoy's War and Peace addresses this dilemma in a summary and a testing of the novelistic tradition that grew out of the work of Rousseau, in both European and Russian literature. We follow the line that leads to Tolstoy's multifaceted inquiry, beginning with two short novels that set the tone for the introspective novel in the two traditions, Constant's Adolphe and Lermontov's Hero of Our Time. Looking at relevant excerpts from a range of European prose writers, Rousseau, Musset, Goethe, Stendhal, and Thackeray among others, we think about the possibilities and limitations of the introspective novel as a form, especially as manifested in one of the monuments of the genre, War and Peace.

[RUSSL 280 The Russian Connection, 1870-1960 (also COM L 280) (IV) (LA)]
The European novel of introspection developed a second line of inquiry, in some respects counter to the tradition that grew out of the writings of Rousseau. Diderot's Rameau's Nephew may be taken as emblematic of a novel that goes beyond the search for self-understanding to focus on alienation, resentment, and rebellion. Dostoevsky was the inheritor of this line in the European prose tradition. His works, in particular Notes from Underground and The Idiot, are the focal point of our discussion. We follow up the tradition as Dostoevsky's influence returns the line to Europe in the works of writers like Camus and Sarratea.

[RUSSL 331 Introduction to Russian Poetry (IV) (LA)]
Fall. 4 credits. 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. Not offered 2004-2005. S. Senderovich.
A survey of Russian poetry, with primary emphasis on the analysis of individual poems by major poets.

[RUSSL 332 Russian Drama and Theater (also THTR 322, COM L 322) (IV) (LA)]
Covers selected topics. Includes discussion of several of the most representative Russian plays of the nineteenth and twentieth centuries in chronological order. Offers introductions to the historical period, cultural atmosphere, literary trends, and major moments in the history of Russian theater. Works studied include Gogol's Inspector General, Ostrovsky's The Storm, and Chekhov's The Cherry Orchard. All readings are in English translation. Additional assignments in critical literature are made for graduate students.

[RUSSL 333 Twentieth-Century Russian Poetry (IV) (LA)]
Spring. 4 credits. This course may be counted toward the 12 credits of Russian literature in the original language for the Russian major. Not offered 2004-2005. N. Pollak.
Course involves close readings of lyrics by major twentieth-century poets. All readings are in Russian.

[RUSSL 334 The Russian Short Story (IV) (LA)]
Spring. 4 credits. 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. Not offered 2004-2005. P. Carden.
This course is a survey of two centuries of Russian storytelly. Emphasis is on the analysis of individual stories by major writers, on narrative structure, and on related landmarks of Russian literary criticism.
RUSSL 335 Gogol # (IV) (LA)
Fall. 4 credits. T R 11:40-12:55. G. Shapiro. Selected works of Gogol are read closely and viewed in the context of his life and the literature of his time. Readings are in English translation.

RUSSL 337 Films of Russian Literary Masterpieces [also COM L 338] (IV)

RUSSL 338 Lermontov's Hero of Our Time # (LA)
The focus of the course is Mikhail Lermontov's Hero of Our Time, which has been called the first major Russian novel. Readings, including also Lermontov's verse, are in Russian, with attention to linguistic and literary problems.

RUSSL 350 Education and the Philosophical Fantasies [also COM L 350] # (IV) (LA)
Fall. 4 credits. M W F 10:10-11:00. P. Carden
A major philosophical tradition has conceived of education as reconstituting the whole of our lives. What we should do or be is seen as the result of every choice we make. The whole of our human context is understood as a school in which we form ourselves. This all-encompassing vision of education has been embodied in the works of the great philosopher-fantasists who use the forms of fiction to explore fundamental issues of education. We examine several key philosophical fantasies, among them Plato's Republic, Rousseau's Émile, and Tolstoy's War and Peace. Our aim is to understand how the discourse on education became a central part of our modern tradition.

RUSSL 357 The Russian Novel [also COM L 367] # (IV) (LA)
Spring. 4 credits. Students who read Russian may sign up for a discussion section of the Russian text for 1 credit (RUSSA 491). Not offered 2004–2005. N. Pollak.
May include works by Pushkin, Gogol, Turgenev, Dostoevsky, Tolstoy, and Chekhov.

RUSSL 360 Russian Literature from 1917 to the Present # (IV) (LA)

RUSSL 369 Dostoevsky # (IV) (LA)
Fall. 4 credits. Limited to 40 students. T R 1:25-2:40. P. Carden.
Course involves close reading of novels and short works by Fyodor Dostoevsky. Dostoevsky's fiction is in contentious dialogue with the literature and philosophy of the preceding century and opens out to the whole of the following century. His critique of European culture, his searching examination of the intrinsic value and his bold experiments with narrative make his work seminal in world fiction. Readings include Notes from Underground, Crime and Punishment, The Idiot, and The Brothers Karamazov.

RUSSL 373 Chekhov in the Context of Contemporary European Literature and Art [also COM L 375] # (IV) (LA)
Fall. 4 credits. T R 10:10-11:00. S. Senderovich.
Reading and discussion of Anton Chekhov's short stories, in the context of the European art of the short story and the paintings of that era. Course designed for non-specialists as well as literature majors. All readings in English translation.

RUSSL 385 Reading Nabokov (also ENGL 379) # (IV) (LA)
Fall. 4 credits. Limited to 18 students, with preference given to seniors. T R 10:10–11:25. G. Shapiro.
This course 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 WWII, 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 (written in 1939), all in English translation. And examine the two widely read novels that he wrote in Itcha while teaching literature at Cornell, Lolita (1955) and Pnin (1957).

RUSSL 393 Honors Essay Tutorial # (IV) (LA)
Fall and spring. 8 credits. Must be taken in two consecutive semesters in senior year. Credit for the first semester will be awarded upon completion of second semester. For information, please see director of undergraduate studies. Times to be arranged with instructor.

RUSSL 409 Russian Stilistics (IV) (LA)
Fall. 4 credits. Also open to graduate students. Preerequisite: 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. Credit for the first semester will be awarded upon completion of second semester. For information, please see director of undergraduate studies. Times to be arranged with instructor.

RUSSL 415 Post-Symbolist Russian Poetry (IV) (LA)
Fall. 4 credits. Pre requisite: 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. Not offered 2004–2005. S. Senderovich.
This course is designed to acquaint students with the way Russian prose has developed during the past 40 years. Emphasis is on comprehensive of the text, but we also discuss literary methods, modern literary history, social and political problems, and the ways the novel in the Soviet Union is reflected in its literature. Course specifically intended for third- and fourth-year Russian majors.

RUSSL 432 Pushkin # (IV) (LA)
Spring. 4 credits. Prequisite: 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. T R 11:40–12:55. S. Senderovich.
Reading in the original language and discussion of selected works by Pushkin: lyrical, narrative poems, and Eugene Onegin.

RUSSL 437 A Moralist and a Pornographer [also COM L 437] (IV) (LA)
Two great novels of the twentieth century, Dr. Zhivago and Lolita, appeared in October 1958, competing for first place on the bestseller list. Both novels concerned the tragic story of a teenage girl sexually exploited by a mature man. Pasternak's novel was hailed as a highbrow and highly moral work of art, and the author soon received the Nobel Prize for literature. Nabokov's novel initially could not even be published in the United States, for it was perceived as a pornographic text.

RUSSL 438 The World of Anna Karenina [also HIST 465] (III or IV) (GA)
For description, see HIST 485.

RUSSL 492 Supervised Reading in Russian Literature # (IV) (LA)
Fall or spring. 1–4 credits each term. Independent study. Prequisite: students must find an advisor and submit a plan before signing up. Times to be arranged with instructor.

RUSSL 493 Anton Chekhov # (IV) (LA)
The first decade of the twentieth century was perhaps the richest period ever in Russian literature and the arts. Beginning with the brilliant experimentation in poetry and prose of Andrei Bely, Blok, Remizov, and others; then continuing with breakthroughs in painting and sculpture by Malevich, Goncharova, Tatlin, et al. In the second decade, the rambunctious Futurists take over in literature and establish a compact with theater and the visual arts in which all the art forms break down the barriers to produce a new kind of art. During this period Russian artists in every medium were on the cutting edge of the European art scene. After the Revolution, Russian artists and writers of the avant-garde continued their dominance for a time, including the developing medium of film. We read representative Russian texts by the major authors of the period and investigate developments in the theater and visual arts.

**Graduate Seminars**

**[RUSSL 605 Russian Analytical Approaches to Literature (also COM L 605)]**

Fall. 4 credits. Prerequisite: proficiency in Russian or permission of instructor. Not offered 2004–2005. S. Senderovich.

Course designed for graduate and well-advanced undergraduate students with sufficient knowledge of Russian literature and a developed interest in the analytical approaches to literary texts. Provides opportunity to study the most sophisticated analytical approaches to literature developed by Russian critics and theorists in the nineteenth and twentieth centuries. Focus is on critical texts with analytical value as opposed to speculative, that is, those that aim at discovering the unforeseeable in the literary texts. Russian sources are studied against the background of contemporary American and European critical theory. Prominently featured are studies by Veselovsky, Tynianov, Jakobson, Bakhtin, and Senderovich.

**RUSSL 611 Supervised Reading and Research**

Fall or spring. 2–4 credits each term. Prerequisite: proficiency in Russian or permission of instructor. Times to be arranged with instructor. Staff.

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**Related Languages**

**Czech**

**CZECH 300 Directed Studies**

Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Times to be arranged with instructor. Please see double-starred (**) note at end of UKRAN section. W. Browne.

Taught on a specialized basis to address particular student needs.

**Hungarian**

**HUNGR 300 Directed Studies**

Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Times to be arranged with instructor. Please see double-starred (**) note at end of UKRAN section. W. Browne.

Taught on a specialized basis to address particular student needs.

**HUNG 427 Structure of Hungarian (also LING 427) (III) (KCM)**

Fall. 4 credits. Prerequisite: LING 101 or equivalent. Offered alternate years. Times to be arranged with instructor. Please see double-starred (**) note at end of UKRAN section. W. Browne.

For description, see LING 427.

**Polish**

**POLSH 131-132 Elementary Polish**

131, fall; 132, spring. 3 credits each term. Prerequisite: for POLSH 132, POLSH 131 or equivalent. This language series (131–132) is not sufficient to satisfy the language requirement. Offered alternate years. M W F 1:25–2:15. W. Browne.

Covers all language skills: speaking, listening, comprehension, reading, and writing.

**POLSH 133-134 Continuing Polish**

133, fall; 134, spring. 3 credits each term. POLSH 134 satisfies language qualification. Prerequisites: for POLSH 133, POLSH 132 or permission of instructor; for POLSH 134, POLSH 133 or equivalent. Offered alternate years. Not offered 2004–2005. Times to be arranged with instructor. Please see double-starred (**) note at end of UKRAN section. W. Browne.

An intermediate conversation and reading course.

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**Serbo-Croatian**

**SEBCR 131-132 Elementary Serbo-Croatian**

131, fall; 132, spring. 3 credits each term. Prerequisite for SEBCR 132: SEBCR 131 or equivalent. This language series (131–132) is not sufficient to satisfy the language requirement. Offered alternate years. Not offered 2004–2005. Times to be arranged with instructor. Please see double-starred (**) note at end of UKRAN section. W. Browne.

Covers all language skills: speaking, listening, comprehension, reading, and writing. Includes Bosnian.

**SEBCR 133-134 Continuing Serbo-Croatian**

133, fall; 134, spring. 3 credits each term. Prerequisite for SEBCR 133: SEBCR 132 or equivalent; for SEBCR 134: SEBCR 133 or equivalent. Offered alternate years. Times to be arranged with instructor. Please see double-starred (**) note at end of UKRAN section. W. Browne.

An intermediate conversation and reading course.

**UKRAN 300 Directed Studies**

Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Times to be arranged with instructor. Please see double-starred (**) note at end of UKRAN section. Staff.

Taught on a specialized basis to address particular student needs.

**Ukrainian**

**UKRAN 300 Directed Studies**

Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Times to be arranged with instructor. Please see double-starred (**) note at end of UKRAN section. Staff.

Taught on a specialized basis to address particular student needs.

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**Sanskrit**

See Asian Studies.

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**SCIENCE & 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 (STS) addresses such issues through the study of the social aspects of knowledge, especially...
The Science & Technology Studies Major

S&T&S courses are organized into a set of core courses plus three themes. Students select the theme that best represents their interests. In consultation with a faculty member, students may devise their own theme as long as it meets the general criteria of coherence and rigor.

Admission to the Major

Students intending to major in Science & 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) the theme the student wishes to pursue in the major; 3) a tentative plan of courses fulfilling S&T&S requirements; and 4) an up-to-date transcript of work completed at Cornell University (and elsewhere, if applicable).

Acceptance into the major requires completion of the following prerequisites:

a) two introductory courses from the categories Historical Analysis (HA), Knowledge, Cognition, and Moral Reasoning (KCM), or Social and Behavioral Analysis (SBA), as listed in the distribution requirements for the College of Arts and Sciences.

b) the science and quantitative requirement of the College of Arts & Sciences.

These courses cannot be used to fulfill the core or other course requirements for the major and must be taken for a letter grade.

Sophomores in the process of completing these prerequisites may be admitted to the major on a provisional basis. Further information and application materials are available in 306 Rockefeller Hall (255-6047).

Requirements

S&T&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 above.

1) Core: one course in each of the following groups (a-c).

   a) Foundation (S&T&S 201)
   
   b) Ethics (choose from S&T&S 205, 206, 360, or 490)
   
   c) History (choose from S&T&S 233, 250, 281, 282, 283, 330, 357, or 447)

2) Theme: Students must elect a theme and take four courses in the theme. Courses taken to satisfy the core course requirements may not be used as part of the required four courses in the theme. At least two of the courses should be at the 300 level or higher, and at least one should be at the 400 level.

Available themes are:

   a) Minds and Machines (S&T&S 212, 250, 281-3, 286, 292, 349, 354, 355, 381, 387, 400, 409, 431, 438, 453, 481, 525)
   
   

In consultation with an S&T&S faculty adviser, students may also devise their own theme as long as it meets the general criteria of coherence and rigor.

3) Additional Science & Technology Studies Courses: additional courses to total 54 credit hours in the major, chosen from the general list of S&T&S courses.

4) Science Requirement: in addition to the science requirement of the College of Arts and Sciences, Science and Technology Studies majors are required to take an additional two semesters of a 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 adviser and should be related to the theme selected by the student.

The Honors Program

The honors program is designed to provide independent research opportunities for academically talented S&T&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. S&T&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 S&T&S honors program, students must have an overall Cornell cumulative grade point average of at least 3.00 and a 3.30 cumulative grade point average 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 advisers; at least one of these must be a member of the S&T&S department. More information on the honors program is available from the S&T&S undergraduate office at 306 Rockefeller Hall (255-6047).

The Biology & Society Major

The Department of Science & Technology Studies also offers the Biology & Society major, which includes faculty from throughout the university. The Biology & 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 & Society students obtain background in the social dimensions of modern biology and in the biological dimensions of contemporary social issues.

The Biology & 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 & 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 & Society major can be found on p. 467 of this catalog.

The Concentration in Science & Technology Studies


The concentration (or minor) in Science & Technology Studies (S&T&S) is designed for students who wish to engage in a systematic, interdisciplinary exploration of the social, political, and ethical implications of the 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&T&S perspective.

To satisfy the requirements for the S&T&S concentration, students must complete with letter grades a minimum of four courses selected from the course offerings listed for the major. At least one course must be chosen from the list of core courses. Two courses must be chosen from one of the themes listed below:

a) Minds and Machines
   b) Science, Technology, and Public Policy
   c) Life in Its Environment

The concentration is completed with one other course in S&T&S. Interested students may obtain further information about courses and a list of course descriptions by contacting the S&T&S undergraduate office, 306 Rockefeller Hall (255-6047).

Course Offerings

Introductory Course

Core Courses

Foundation Course

Ethics

History

Theme Courses

Minds and Machines

Science, Technology, and Public Policy

Life in Its Environment

Independent Study

Graduate Seminars
An introduction to public policy issues involving developments in science and technology. We study such topics as secrecy and national security, the politics of expertise, public understanding of science, computers and privacy, and the management of risk. We apply concepts from the field of science and technology studies to analyze how issues are framed and public policy produced.

Core Courses

Foundation Course

S&Ts 201 What Is Science? An Introduction to the Social Studies of Science and Technology (also SOC 210) (III) (CA)
Spring. 3 credits. T. Pinch.
This course introduces some of the central ideas in the field of Science and Technology Studies (S&Ts). As well as serving as an introduction to students who plan to major in Bio/Info & Society or in Science & 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 class meets on Monday and Wednesday for lecture and on Friday in discussion sections. 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 will be collectively exposed to particular themes.

S&Ts 202 Science in Western Civilization (also HIST 282) (#) (III) (HA)
Spring. 4 credits. S&Ts 282 is not a prerequisite to 282. P. Dear.
For description, see HIST 282.

S&Ts 283 The Sciences in the Twentieth Century (also HIST 280) (III) (HA)

S&Ts 330 Physical Sciences in the Modern Age (III) (HA)
Fall. 3 credits. S. Seth.
This course will examine the history of the physical sciences in the United States from 1800 to the present. We will study such topics as the development of thermodynamics and electromodynamics, the quantum and relativity theories, science during the world wars, and post-war “big science.”

As well as a history of ideas, the course will emphasize the broader historical contexts in which physical science has been produced, focussing 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 will range from primary source material (original papers by Thomson, Helmholtz, Planck, and Einstein) to extracts from Mary Shelley’s Frankenstein and Michael Frayn’s Copenhagen.

S&Ts 357 Engineering in American Culture (also ENGRG 357, HIST 357) (III) (CA)
Fall. 3 credits. R. Kline.
For description, see ENGRG 357.

Theme Courses

Minds and Machines

S&Ts 212 Sophomore Seminar: Sound Studies (III) (CA)
Fall. 4 credits. T. Pinch.
“Sound studies” is a newly emerging area of research within academia. It takes as its topic the different ways that humans experience the world of sound and how sound is embedded in history, cultures, institutions, and technologies. The approach the course will take is to give students the opportunity to engage with particular sonic experiences, critically analyze them, and develop skills in writing about sound. Students will read, discuss, and comment upon selected works in Science and Technology Studies that engage with sound. Students will be asked to keep “sound diaries” in which they write about features of their personal sonic environments and how technology mediates these environments. Throughout the course students will be collectively exposed to particular sonic environments and will be asked to write about them in different ways. This writing will be shared in class and feedback provided by the instructor.

This is a special seminar sponsored by the John S. Knight Institute’s Sophomore Seminars Program. Seminars offer discipline-specific 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. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

S&Ts 250 Technology in Society (also ENGRG 250, ECE 250, HIST 250) (III) (HA)
Fall. 3 credits. Offered alternate years. Next offered 2005-2006. R. Kline.
For description, see ENGRG 250.

S&Ts 281 Science in Western Civilization (also HIST 281) (#) (III) (HA)
For description, see HIST 281.

S&Ts 282 Science in Western Civilization (also HIST 282) (#) (III) (HA)
Spring. 4 credits. S&Ts 282 is not a prerequisite to 282. P. Dear.
For description, see HIST 282.

S&Ts 283 The Sciences in the Twentieth Century (also HIST 280) (III) (HA)

S&Ts 288 Science and Human Nature (also PHIL 286) (IV) (KCM)
Spring. 4 credits. R. Boyd.
For description, see PHIL 286.

S&Ts 292 Invent an Information Society (also ECE 298, ENGRG 298, and HIST 292) (III) (HA)
Spring. 3 credits. R. Kline.
For description, see ENGRG 298.

S&Ts 349 Media Technologies (also INFO 349, COMM 349) (III) (HA)
Spring. 3 credits. T. Gillespie.
From the first attempts at printing symbols into clay, to the latest software available on the Net, our efforts to communicate have depended on the technologies we develop. Our commonplace notions of communication and of society regularly overlook the role of the material artifacts. This course will consider the technologies of media—including writing, printing, photography, film, telegraph, telephone, radio, television, computer networks—as an opportunity to think about the intersection of technology and its social context.

S&Ts 354 The Sociology of Contemporary Culture (also SOC 352) (III) (CA)
Fall. 4 credits. C. Leuenberger.
This course introduces students to the rapidly expanding body of work at the intersection of sociology, cultural studies, and science and technology studies. It provides an introduction to theoretical debates as cultural and to sociological studies of culture. We will discuss 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.

S&TS 355 Computers: From Babbage to Gates (III) (HA)
Fall. 4 credits. No technical knowledge of computer use is presumed or required.
R. Prentice.
Computers have not always been the ubiquitous beige boxes gracing our desktops; in Victorian London, Charles Babbage attempted to build his analytical engine using gears and steel rods; and during World War II the Allied governments used sophisticated electro-mechanical and electronic “brains” to break Axis codes. Machines that once occupied entire rooms now travel in knapsacks. How did this technology, once considered esoteric and useful only to technical specialists, colonize industry, academia, the military, the federal government, and the home? Using primary historical materials, including novels, films, archival documents, and other texts we follow computers from Babbage’s Victorian dream of an analytical engine to the visions of contemporary moguls like Bill Gates, whose goal is “information at your fingertips.” We explore not only how computer technology affects society, but how culture and politics enable and sustain the development of the machine. This is a course in the history and sociology of computers; a background in computer science is not required.

S&TS 381 Philosophy of Science: Knowledge and Objectivity (also PHIL 381) (IV) (KCM)
Fall. 4 credits. R. Boyd.
For description, see PHIL 381.

[S&TS 387 The Automatic Lifestyle: Consumer Culture and Technology (also INFO 387) (III) (CA)]
P. Sengers.
Our daily lifestyle in consumer culture is intimately intertwined with technology. Industrialized technology makes consumer culture possible, yet at the same time the economic and cultural trends of consumer culture select and shape the kinds of technology that become available. How is our daily lifestyle in consumer culture shaped by technology? How does everyday technology shape the demands of consumer culture? What alternatives do we have? In this class, we synthesize history, sociology, human-computer interaction, and speculative design to answer these questions.

[S&TS 400 Components and Systems: Engineering in a Social Context (also M&AE 400) (III)]
Fall. 3 credits. Not offered 2004–2005.
Z. Warhaff.
For description, see M&AE 400.

[S&TS 409 From the Phonograph to Techno (also SOC 409) (III)]
T. Pitch.
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 and how such technologies and sounds have been shaped by and have shaped the larger society and culture of which they are a part. We look at the history of sounds technologies like the phonograph, the electronic music synthesizer, samplers, and the Sony Walkman. Our perspective is drawn from social and cultural studies of science and technology. Students are encouraged to carry out a small original research project on their favorite sound technology.

[S&TS 431 From Surgery to Simulation (III) (SBA)]
Fall. 4 credits. R. Prentice.
A cliche among medical professionals says, “If you have a hammer, every problem looks like a nail.” In other words, treatment decisions are often dictated by available technologies. This course looks at medical technologies from the perspective of x-rays to antidepressants and the ways they shape how medical professionals look at and practice upon the human body. We will take a broad view of technology, encompassing systems of practice that shape how work is conducted and the body is understood, as well as specific machines and treatments with specific uses. We will consider how these technologies often are not only treatments for individual patients but also metaphors for larger cultural questions.

[S&TS 438 Minds, Machines, and Intelligence (also COGST 438) (III) (KCM)]
R. Boyd.

[S&TS 453 Knowledge and Society (also SOC 453) (III) (CA)]
Spring. 3 credits. C. Leuenberger.
This course focuses on the historical evolution of the sociology of knowledge as a theoretical paradigm and an empirical research field. We examine the phenomenological origins of the sociology of knowledge and many of its central texts. We study how it has been applied to such areas as personhood, interaction, religion, identity, and the emotions. We also consider epistemological questions that arise, and cover various theoretical and empirical approaches that have been influenced by the sociology of knowledge such as ethnomethodology, conversation analysis, and the sociology of science and technology.

[S&TS 481 Philosophy of Science (also PHIL 481) (IV) (KCM)]
R. Boyd.
For description, see PHIL 481.

[S&TS 525 Seminar in the History of Technology (also HIST 525)]
R. Kline.

Science, Technology, and Public Policy

[S&TS 281 Science in Western Civilization (also HIST 281) # (III) (HA)]
Fall. 3 credits. Not offered 2004–2005.
P. Dear.
For description, see HIST 281.

[S&TS 282 Science in Western Civilization (also HIST 282) # (III) (HA)]
Spring. 4 credits. P. Dear.
For description, see HIST 282.

[S&TS 283 The Sciences in the Twentieth Century (also HIST 280) (III)]

[S&TS 331 Environmental Governance (also B&SOC 331, NTRES 331)]
Spring. 3 credits. S. Wolf.
For description, see NTRES 331.

[S&TS 350 Atomic Consequences: The Incorporation of Nuclear Weapons in Postwar America (also GOVT 305, AM ST 350) (III) (CA)]
Staff.

[S&TS 352 Science Writing for the Mass Media (also COMM 352) (III)]
Fall. 3 credits. B. Lewenstein.
For description, see COMM 352.

[S&TS 361 Ethical Issues in Engineering (also ENGRG 360) (III)]
Spring. 3 credits. P. Doing.
For description, see ENGRG 360.

[S&TS 390 Science in the American Polity, 1800–1960 (also GOVT 306, AM ST 388) (III)]
Staff.

[S&TS 391 Science in the American Polity, 1960–Now (also GOVT 309, AM ST 389) (III) (SBA)]
Spring. 4 credits. S. Hilgartner.
This course reviews the changing political relations between science, technology, and the state in America from 1960 to the present. It focuses on the politics of choices involving science and technology in a variety of institutional settings, from Congress to courts and regulatory agencies. The tensions and contradictions between the concepts of science as an autonomous republic and its just another special interest provide a central theme for the course. Topics addressed include research funding, technological controversies, scientific advice, citizen participation in science policy, and the use of experts in courts.

[S&TS 406 Biotechnology and Law (also B&SOC 406) (III) (SBA)]
Staff.

[S&TS 407 Law, Science, and Public Values (also B&SOC 407) (III) (SBA)]
Spring. 4 credits. M. Lynch.
This course examines problems that arise at the interface of law and science. These problems include the regulation of novel technology, the role of technical expertise in public decision-making, and the control over scientific research. The first part of the course covers basic perspectives in science and technology studies (S&TS) and how they relate to legal decisions and processes. The second part of the course 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. 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.
[S&TS 411 Knowledge, Technology, and Property (III) (SBA)]

[S&TS 433 International History of Science (III) (HA)]

[S&TS 442 The Sociology of Science (also B&SOC 442, CRP 442, SOC 442) (III) (SBA)]
Fall. 4 credits. Not offered 2004-2005. Staff.

[S&TS 444 Historical Issues of Gender and Science (also FGSS 444) (III) (CA)]
Spring. 4 credits. Not open to freshmen. S. Sethi.
For description, see “Life in Its Environment” theme.

[S&TS 466 Public Communication of Science and Technology (also COMM 466) (III)]
For description, see COMM 466.

[S&TS 467 Innovation: Theory and Policy (III) (SBA)]
Fall. 4 credits. Open to upper-level undergraduates and interested graduate students. Prerequisite: ECON 102 or permission of the instructor. Next offered 2005-2006. J. Reppy.
In this course we study the innovation process (that is, the introduction of new technology into practice) through the critical analysis of selected theories of innovation and supporting empirical evidence. Economic theories are contrasted to the insights found in science and technology studies. The focus is on the context of interests and ideology in which the various theories have been framed and their differing implications for technology policy. Authors covered include Schumpeter, Solow, Scherer, Nelson and Winter, and Bijker and Pinch.

[S&TS 473 Knowledge and Politics in Seventeenth-Century England (also HIST 471) # (III) (CA)]
For description, see HIST 471.

[S&TS 483 The Military and New Technology (also GOVT 483) (III) (SBA)]
Spring. 4 credits. K. Vogel.
For description, see GOVT 483.

[S&TS 487 Seminar in the History of the Environment (III) (HA)]

[S&TS 490 The Integrity of Scientific Practice (III) (KCM)]

[S&TS 493 Economics Meets Science Studies (III) (CA)]

[S&TS 532 Inside Technology: The Social Construction of Technology (also SOC 532)]
Fall. 4 credits. Not offered 2004-2005. Staff.

[S&TS 205 Ethical Issues in Health and Medicine (also B&SOC 205) (IV) (KCM)]
Fall. 4 credits. S. Hilgartner.
For description, see B&SOC 205.

[S&TS 206 Ethics and the Environment (also B&SOC 206, PHIL 246) (IV) (KCM)]
Spring. 4 credits. N. Sethi.
For description, see B&SOC 206.

[S&TS 233 Agriculture, History, and Society: From Squanto to Biotechnology (III) (HA)]

[S&TS 281 Science in Western Civilization (also HIST 281) # (III) (HA)]
For description, see HIST 281.

[S&TS 282 Science in Western Civilization (also HIST 282) # (III) (HA)]
Spring. 4 credits. P. Dear.
For description, see HIST 282.

[S&TS 283 The Sciences in the Twentieth Century (also HIST 280) (III) (HA)]
Fall. 4 credits. Not offered 2004-2005. Staff.

[S&TS 285 Communication in the Life Sciences (also COMM 285) (III)]
Spring. 3 credits. B. Lewenstein.
For description, see COMM 285.

[S&TS 286 Science and Human Nature (also PHIL 286) (IV) (KCM)]
Spring. 4 credits. R. Boyd.
For description, see PHIL 286.

[S&TS 287 Evolution (also BIOEE 207 and HIST 287) (I or III) (PBS)]
Fall. 3 credits. A. MacNeill.
For description, see BIOEE 207.

[S&TS 301 Life Sciences and Society (also B&SOC 301) (III) (SBA)]
Fall. 4 credits. M. Lynch.
For description, see B&SOC 301.

[S&TS 311 Sociology of Medicine (III) (SBA)]
Spring. 4 credits. C. Leuenberger.
This course provides an introduction to the ways in which medical practice, biomedical technology, and the medical profession are embedded in society and shaped by social phenomena. Accountability to patients and the public; and struggles over the control of medical practice in a world where medicine is connected to gender, class, race, and personal autonomy are important overarching themes.
We examine the structure of the medical profession; medical training and professional socialization; the social organization of the hospital; and doctor-patient interactions.
The course also explores how biomedical knowledge and technology are produced, assessed, and introduced into clinical practice. Topics may include the intensive-care unit, the training of surgeons, and the regulation of pharmaceuticals, AIDS and breast cancer activism, genetic testing, and priority setting in biomedical science.

[S&TS 324 Environment and Society (also D SOC 324 and SOC 324) (III) (SBA)]
Fall. 3 credits. C. Geisler.
For description, see D SOC 324.

[S&TS 331 Environmental Governance (also B&SOC 331, NTRES 331)]
Spring. 3 credits. S. Wolf.
For description, see NTRES 331.

[S&TS 333 Genomics and Society (also D SOC 333) (III) (SBA)]
For description, see D SOC 333.

[S&TS 406 Biotechnology and Law (also B&SOC 406) (III) (SBA)]

[S&TS 411 Knowledge, Technology, and Property (III) (SBA)]

[S&TS 425 From "Cold Mothers" to "Autistic Dads"—Autism in Twentieth-Century America (also B&SOC 425) (III) (SBA)]
Fall. 4 credits. Offered only in 2004 and 2005. C. Silverman.
Autism was first characterized as a disorder of affective contact by Leo Kanner in 1943. Since then, this disease category has shifted from a psychogenic illness, caused by cold mothers, to a form of brain damage: to a highly heritable genetic neurological disorder involving possible environmental factors. Treatment has varied according to the dominant theory. Such dramatic shifts are impossible to comprehend outside of the social and historical context in which illnesses and diagnoses are produced and understood. This course uses autism as a lens through which to consider the changing context of psychiatric and developmental disabilities in America, in the late twentieth century and the present, paying close attention to the role of interactions between parent groups, medical practitioners, researchers, and legislators.

[S&TS 431 From Surgery to Simulation (III) (SBA)]
Fall. 4 credits. R. Prentice.
For description, see “Minds and Machines” theme.

[S&TS 444 Historical Issues of Gender and Science (also FGSS 444) (III) (CA)]
Spring. 4 credits. Not open to freshmen. S. Sethi.
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 twentieth 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, we shall have attained a broad view of the problems that have faced women entering science and those that still remain.
In this course, we will analyze information technology using historical, qualitative, and critical approaches. We will discuss 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 will investigate these issues through the lenses of long-standing debates and current controversies.

[S&T 634] Topics in the History of Women in Science (also FGS 644)

[S&T 645] Genetics: Politics and Society in Comparative Perspective (also GOVT 634)

[S&T 664] Constructionism in Social Science

[S&T 675] Science, Race, and Colonialism
Spring. 4 credits. S. Scht.

Scholarly work in the last two decades has come increasingly to pay attention to the often-neglected linkages between the sciences and the discourses and practices of colonialism. Texts of broad conception like Michael Adas's *Machines as the Measure of Men* and Gyan Prakash's recent *Another Reason* have made an attempt to provide an overview of many of the issues involved, but the field awaits a genuinely synthetic treatment. This course will aim to provide the framework for such a treatment by looking at a number of key areas of interest. Beginning with a survey of the history of ideas of race and the development of 'race science', we will move on to consider a series of specific topics, including the importance of social statistics and technologies of identification (fingerprinting), medicine, hygiene, technologies of overt control, scientific nationalism and nationalist science, the periphery as laboratory, gender, and savagery and savagery and polymancy. Readings will comprise a mixture of primary and secondary sources, and students are encouraged to contribute topics and texts of particular interest.

[S&T 680] Seminar in Historiographical Approaches to Sciences (also HIST 680)

For description, see HIST 680.

[S&T 681] Philosophy of Science (also PHIL 681)

For description, see PHIL 681.
the epistemic, discursive, institutional, and political dimensions of emerging technologies in an effort to understand the social worlds that shape technological change.

**Independent Study**

**SATS 699 Graduate Independent Study**
Fall or spring: 2-4 credits. Permission of department required. Applications and information are available in 306 Rockefeller Hall.

**SCIENCE OF EARTH SYSTEMS**
The full faculty of the Department of Earth and Atmospheric Sciences (see page 503) plus the following: W. Brutsaert (civil and environmental engineering); P. Girrasch (architecture); J.-Y. Parlange (biological and environmental engineering); J. Yavitt (natural resources).

The Science of Earth Systems (SES) is the study of the interactions among the atmosphere, oceans, biosphere, and solid Earth; these dynamic interactions control the global environment. The interdisciplinary, basic science approach of SES incorporates major components of geology, ocean and atmospheric sciences, terrestrial hydrology, biogeochemistry, and ecology into an integrated study of Earth as a complex system. Earth system science presents one of the outstanding intellectual challenges in modern science and is the primary foundation for the future management of our home planet.

The Major

The major in Science of Earth Systems emphasizes a rigorous, objective study of the Earth and its systems with broad preparation in basic sciences and mathematics, followed by the choice of an area of concentration for study in greater depth. The Science of Earth Systems program seeks to train students in a strong set of fundamental skills that will allow them to approach with quantitative rigor a wide range of questions about the Earth and its environment, and to adapt those skills rapidly to new areas of inquiry as they arise. The major in Science of Earth Systems is by nature interdisciplinary, and involves faculty from the College of Arts and Sciences, the College of Engineering, and the College of Agriculture and Life Sciences. In the College of Arts and Sciences the program is administered by the Department of Earth and Atmospheric Sciences.

The SES curriculum begins with a series of courses designed to provide preparation in fundamental science and mathematics necessary for a rigorous study of Earth Systems. This preparation is followed by three SES core courses providing breadth and integration. An additional set of four intermediate to advanced courses designed to provide depth and a degree of specialization.

Students in the College of Arts and Sciences choosing to pursue the Science of Earth Systems major are required to take the following courses: PHYS 207–208 (or 112–113), CHEM 207–208, BIO G 101–102/104 (or 109–110), and MATH 111–112 (or 121–122, or 190/191–192). Three additional 3- to 4-credit hour courses in mathematics, physics, chemistry, or biology are required.

These additional courses must require one or more of the basic courses listed above as a prerequisite. One of the courses must be either EAS 201 or BIOEE 261. Both EAS 201 and BIOEE 261 can be chosen. The mathematics at the level of MATH 221 or 293 is strongly recommended for all SES students, and those choosing areas of concentration in Atmospheric Sciences, Environmental Geophysics, or Hydrology should take MATH 222 or 293.

The three required SES core courses are: EAS 331/ASTRO 331 Climate Dynamics; EAS 302 Evolution of the Earth System; EAS 321/NTFRS 521 Introduction to Biogeochemistry.

Four additional 3- to 4-credit classes selected from 300- and 400-level courses, approved for an SES concentration, are required. These courses will ordinarily be organized around one of the SES areas of specialization.

For further information and applications contact Bryan L. Isacks, bli@cornell.edu. Also see the SES web site at www.eas.cornell.edu for up-to-date information. Administrative offices are located at 2122 Snee Hall.

**SOCIETY FOR THE HUMANITIES**

**SINHALA (SINHALESE)**
See Department of Asian Studies.

**SERBO-CROATIAN**
See Department of Russian.
These seminars are open to graduate students, suitably qualified undergraduates, and visiting faculty in weekly discussion of economic, military, and cultural aspects of contemporary American foreign and domestic policy. While the notion of "empire" has been increasingly used to characterize U.S. global power by journalists, politicians, and scholars, the course takes up as a heuristic term requiring both debate and demonstration.

S HUM 394 American Empire: Critical Perspectives (also DOC 494)
Spring. 4 credits. Limited to 20 students.
B. de Bary and T. Hirschel.
The course is conducted in a seminar format and engages students, core faculty, and visiting faculty in weekly discussion of economic, military, and cultural aspects of contemporary American foreign and domestic policy. While the notion of "empire" has been increasingly used to characterize U.S. global power by journalists, politicians, and scholars, the course takes up as a heuristic term requiring both debate and demonstration.

S HUM 403 Translation Inside and Outside
Spring. 4 credits. Limited to 15 students.
K. Taylor.
Translation from the vantage of the translator: choices to be made, strategies for making these choices, and the implications of these strategies. Between equivalence and equivocation, this seminar aims students to move from the actual practice of translation to developing their own theories about what they are doing.

S HUM 404 Ovid's Metamorphoses (also COM L 447 and ENGL 409)
Fall. 4 credits. Limited to 15 students.
J. Ortiz.
Ovid's Metamorphoses stands as one of the largest influences on Western literature, music, and art. It is also a surprisingly smutty read. This course will take a transnational and transnationalist approach to Ovidian "translations," primarily in the Renaissance, paying special attention to issues of imitation, genre, narrativity, and Renaissance debates over aesthetics and the moral value of classical literature. Readings will include: Dante, Petrarch, Ariosto, Spenser, Jonson, Marston, Shakespeare, and Milton, as well as selections from music, opera, and visual art from the sixteenth century to the present.

S HUM 408 Translation and Cultural Difference (also ASIAN 418 and COM L 470)
Fall. 4 credits. Limited to 15 students.
N. Sakai.
We will survey the theories of translation with a special emphasis on the relationship between transnational translation and transnational difference. The seminar will investigate different economies of translation by which different social and cultural identities are constructed and/or transformed. The historical transformation of translation and the accompanying genesis of linguistic and cultural identity will be examined in reference to historical materials.

S HUM 410 The Classical in Colonial Asia (also ASIAN 419, HIST 406, VI SST 411, and RELST 412)
Fall. 4 credits. Limited to 15 students.
A. Blackburn.
This seminar explores notions of antiquity and classical culture articulated through scholarly works, more popular genres, and government-supported restoration projects, primarily between 1860 and 1920. Readings and visual materials, drawn from British, French, and Siamese contexts, explore similarities and differences across their (interactive, and in some sense competitive) cultural spheres and identify their impact on colonial-period Sri Lanka.

S HUM 411 The Multicultural Alhambra (also ART H 411, NES 451, VI SST 421, and SPANL 411)
Fall. 4 credits. Limited to 15 students.
A. Blackburn.
An interdisciplinary seminar structured around the mythic (and, as presented by most extant scholarship, quintessentially Islamic) palace built by the Nasrid dynasty in Granada, Spain, and its function as both subject and object in a myriad of cultural translations (textual, visual, ideological, and religious). We will use primary sources in various genres, critical writings in the field of post-colonial theory, and literary criticism spanning the nineteenth, twentieth and now-twenty-first centuries, including Elena Díez Jorge's Para una lectura multisite de la Alhambra de Granada (Granada, 2000), to approach this "epigenetic" structure in the public and private sphere in a variety of contexts. We will consider the building through the variety of lenses offered by R. Crail, N. Sakai, and others, to deconstruct the myth of its uniqueness and view it as a monument supremely representative of the continuous performance of cultural translations offered by late medieval Iberia. The seminar will be taught in cooperation with "The Alhambra: An International Frontiers: A Cross-Disciplinary Research Symposium on Mudjar History, Religion, Art, and Literature," to be held at Cornell during the fall of 2004. Students will attend the symposium and participate in discussions, both organized and informal, with the speakers, including Dr. Díez Jorge.

S HUM 412 Roots of Linguistic Representation (also LING 700.1)
Fall. 4 credits. Limited to 15 students.
J. Whitman.
This course will examine the historical/political/social bases of linguistic representation, beginning with the practice of "glossing" developed in many reading traditions, through the kinds of representation involved in the language reconstruction, and including contemporary phonetic, syntactic, and semantic representation. Reading will focus on exemplary texts, but will also include current critics of the project of representation.

S HUM 413 Translating the Untranslatable (also COM L 414 and VI SST 413)
Fall. 4 credits. Limited to 15 students.
H. Petrovsky.
This course will examine the untranslatable in translation according to the three basic lines of research: inner translation, or the experience of estranging one's own mother language; translation and the image, including an analysis of the collective patterns of affectivity implied by the photograph; and finally, the ethics of translation grounded in its multiple cultural forms.

S HUM 415 Near Eastern Scribes (also JWST 431 and NES 431)
Fall. 4 credits. Limited to 15 students.
A. Rahman.
This course is intended to introduce students to the translation methods in the Semitic world, through the figure of the scribe. The course will place the scribe in his intellectual milieu. Moreover, we will reflect upon both the role of the modern translator and the application of new theories about translation to ancient texts.

S HUM 416 Epic Heroes: Text to Screen
Spring. 4 credits. Limited to 15 students.
M. Winkler.
This seminar examines cinematic adaptations of epic literature. The texts and films chosen showcase the most influential of epic--heroic narrative. All are influential works that represent the best of the genre in either medium. The seminar approaches films as visual texts to be interpreted in ways comparable to the interpretation of literature ("close readings").

S HUM 417 Translating Violence
Spring. 4 credits. Limited to 15 students.
C. Merrill.
What assumptions must be made about the universality of human rights and the sovereignty of the self to enable someone to tell a story of slavery in nineteenth-century America or of communal persecution in twentieth-century South Asia? This course will examine select examples of testimony (court records, autobiography, and oral history) that translate the private experience of physical violence into public narrative to ask how victims of violence can narrate experiences of injustice when representatives of the state seem unable to recognize their pain?

S HUM 419 Spatial Histories of Latin America (also HIST 427)
Spring. 4 credits. Limited to 15 students.
R. Craib.
This course examines the relationship between history and geography. It does so primarily by looking at how space is translated into text through acts of exploration, surveying, and mapmaking in Latin America, from its geographical construction as part of a "New World" to the present. Readings of mostly secondary texts from history, literary criticism, anthropology, geography, and art history.

S HUM 420 Translating Greece (also CLASS 402)
Spring. 4 credits. Limited to 15 students.
G. Holst-Warhaft.
The seminar will focus on translation in the broadest sense, examining how the cultural products of a particular country—Greece—are carried across linguistic and cultural boundaries. Discussions will range from nineteenth- and twentieth-century translations of ancient Greek drama, to the treatment of antiquity in modern Greek literature, and the retranslation of antiquity in the service of tourism and the Olympic Games.

S HUM 421 Amphibological Regions
Spring. 4 credits. Limited to 15 students.
J. Solomon.
This course explores how knowledge is tied to geography in modernity through a metaphysics of translation. The resulting "amphibological region" is a quintessential biopolitical habitat, corresponding to Foucault's notion of modern Man as an "empircos-transcendental doubleness." Course readings focus on changes in production, ontology, and sovereignty.
This course investigates a series of political and philosophical traditions that flourished during the 17th and 18th centuries, including the works of Thomas Hobbes, John Locke, and Jean-Jacques Rousseau. It will explore the ways in which these thinkers articulated the idea of a social contract, the concept of natural rights, and the role of the state in securing these rights. Students will engage with primary texts and secondary literature to understand the historical context in which these ideas were developed and the ways in which they continue to influence modern political thought.

Secondary readings will include works by Benjamin, de Man, Kermode, Said, Spivak, Bhabha, Clifford, Rama, Garcia Canclini, Breton, Lefort, and Nancy.

S HUM 423 Translating Tradition
Spring. 4 credits. Limited to 15 students. J. Rodriguez-Garcia.
This seminar will examine the nature of translation as a cultural practice and its role in the transmission of cultural knowledge. Students will explore the processes of translation, including the transfer of meaning from one language to another, and the impact of translation on cultural identity and social relations. Through participation in a translation project in the post-colonial era.

S HUM 424 The Blind Detective (also CLASS 494)
Spring. 4 credits. Limited to 15 students. F. Ahl.
Since no one can read all languages, much of our reading of literature is mediated by translators. How reliable are the translations we use? And, when given a choice, how are we to assess which versions will bring us closest to an original we don't know? Translation of major works of Western literature for classroom use is big business, and a successful translation of, say, Homer or Plato, will bring the publisher and, sometimes, the translator a lot of money. Does this lead to a "dumbing down" of originals or to ensuring that translations reflect, rather than alter, the tone, texture, and substance of the originals? We will begin with modern versions of Chaucer: excerpts from the Canterbury Tales and Troilus, and then move to selections from Virgil's Aeneid, Sophocles' Oedipus and Antigone, Plato's Republic, and Homer's Odyssey. Participants will be invited to bring in their own selections for discussion (provided the originals are at least somewhat within the linguistic competence of the instructor). Ideally, participating students will have some knowledge of, and interest in, a particular language other than English as well as an anglophone literature.

S HUM 425 Translating into English
Spring. 4 credits. Limited to 15 students. C. Porter.
This course will focus on theoretical and practical problems of translating literary and non-literary texts from French or Spanish into English. Weekly readings of theoretical essays will inform discussion of issues raised by students presenting excerpts from their own work.

S HUM 426 Colonialism and Modernity
Spring. 4 credits. Limited to 15 students. J. Blanco.
This course investigates a series of political and literary fictions that produce the anomalous cultural authority from one nation to another. We will consider non-literary texts from French or Spanish into English. Weekly readings of theoretical essays will inform discussion of issues raised by students presenting excerpts from their own work.

S HUM 439 Poetry and Poetics of Translation (also COM L 643, COM L 439, ENGL 408, and GERST 439)
Fall. 4 credits. Limited to 15 students. J. Monroe.
See COM L 439 for full course description.

SOCIOLGY


Sociology is the study of human social organization, institutions, and groups. The Department of Sociology offers courses in a number of key areas, including 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 also 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.

Sociology Courses for Nonmajors
Sociology provides students with particularly effective ways to understand the complexities of modern life. For many students, the undergraduate years are a last opportunity to gain the insights these fields have to offer. The Department of Sociology is continuing to design an array of beginning and advanced courses that convey a broad understanding of the methods and insights of sociological analysis—courses that will be of particular interest to undergraduates who may not major in sociology. First- and second-year students should note that the introductory courses (101, 103, 105, 108, and 115) focus on the sociological analysis of major issues of public life, and that a wide selection of general education courses is available at the 200 level. Advanced undergraduates who are majors in other fields should also see, in particular, descriptions of the 300- and 400-level courses, for which there are no prerequisites other than junior or senior status.

Related Courses in Other Departments
Students interested in sociology should consult the course lists of the other social science departments in the College of Arts and Sciences (including Anthropology, Economics, Government, and Psychology) and of the following departments in other colleges: Organizational Behavior (School of Industrial and Labor Relations), Human Development (College of Human Ecology), and Development Sociology (College of Agriculture and Life Sciences).

The Sociology Major
The Department of Sociology is one of the social science departments at Cornell with the highest national ranking. Faculty members are internationally recognized for their scholarly work, and have received numerous awards, research fellowships, and research grants.

The twenty-one professors who are currently in the department are dedicated to scholarly inquiry that is both methodologically rigorous and theoretically innovative. The breadth of their substantive interests and the variety of their methodological styles are well demonstrated in the different fields that are represented within the department. These include comparative societal analysis, culture, deviance and social control, education, economic sociology, family, gender, inequality, social networks, organizations, political sociology, public policy, race and ethnic relations, religion, science and technology, social movements, and social psychology.

Career Opportunities for Graduates
An undergraduate degree in sociology is one of the most popular degrees in the arts and sciences. After engineering and computer science, sociology is the most able to place graduates into jobs immediately after completing their bachelor's degree. This is not altogether surprising, since sociology can lead to a rewarding career in any of the following fields:

- government: urban/regional planning, affirmative action, foreign service, human rights management, personnel management
- research: social research, consumer research, data analysis, market research, survey research, census analysis, systems analysis
- criminal justice: corrections, criminology, assistance, police work, rehabilitation counseling, criminal investigation, parole management
- teaching: public health education, school admissions, college placement
- community affairs: occupational counseling, career counseling, public health administration, hospital administration, public administration, social assistance advocacy, fund-raising, community organizing, social work
- business: advertising, sales, project management, sales representation, market analysis, real estate management, journalism, public relations, insurance, human resource management, production management, labor relations, quality control management

Requirements for the Major
In addition to the academic requirements established by the College of Arts and Sciences, you must also fulfill requirements toward a specified major. There are 10 courses...
To declare the sociology major, you need to take the following steps:

- Obtain a campus copy of your transcript from Day Hall and bring it to the department office (316 Uris Hall).
- Obtain a sociology major packet from Susan Meyer, undergraduate assistant, during her office hours (316 Uris Hall). During your meeting with her, you will fill out a major declaration form.
- Leave this form and your transcript to the College of Arts and Sciences for acceptance as Cornell credit. The sociology department will receive a copy of the student’s undergraduate transcript and it will also be indicated on the student’s diploma.

Director of Undergraduate Studies: The director of undergraduate studies will:
- provide information about departmental curricula and the requirements for the major.
- meet with applicants to the major.
- review applications for sociology majors and accept students into the program.
- assist students in finding an advisor in the sociology department.
- screen sociology classes taken outside Cornell for acceptance as Cornell credit.
- serve as the backup for faculty advisors who are absent during advising periods.

Faculty Advising: Once you are a declared sociology major, you will be assigned a faculty advisor within the Sociology Department. When you declare sociology as a major, you will be asked to name your preference for an advisor; however, if you are not sufficiently familiar with the program, the director of undergraduate studies can assist you in selecting a faculty member to work with you.

Academic Advising in Sociology

As a student at Cornell, you are ultimately responsible for the policies, procedures, and requirements regarding your degree as stated in the current Courses of Study. After reading this document, you may find that you are still confused or unclear about some of the requirements, and you may have questions and concerns that pertain to your individual situation. Several sources of academic assistance and advice are available to you.

College Adviser: As a sociology major, you are a student in the College of Arts and Sciences. For assistance and advice, college advisers are available to you by appointment in the Office of Undergraduate Admissions and Academic Advising (Goldwin Smith Hall). It is recommended that you consult with a college adviser sometime before your last semester to discuss the completion of college requirements, graduation, and residency requirements.

Research Opportunities

Qualified sociology majors are invited to participate with faculty members in conducting research. Such projects are usually initiated in one of two ways: the student may offer to assist the faculty member in an ongoing project, or the student may request that the faculty member supervise the execution of a project conceived by the student. In either case, the student should enroll in SOC 491 (Independent Study). Interested students may direct inquiries to any faculty member.

The Sociology Honors Program

Honors in sociology are awarded for excellence in the major, which includes overall grade point average and completion of an honors thesis. In addition to the regular requirements of the major, candidates for honors must maintain a cumulative grade point average of at least a B+ in all sociology classes, complete SOC 495 and SOC 496 (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 advisers’ 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 it will also be indicated on the student's diploma.

Admission to the Honors Program

To qualify for entrance into the honors program, students must have at least a B+ grade point average overall and a B+ grade point average in the major. In addition, they must secure the consent of a faculty member in the Sociology Department who will guide their honors thesis.

Students who wish to be considered for honors should apply to the director of undergraduate studies no later than the second term of their junior year. Honors program application forms are available in 316 Uris Hall. The application must include a copy of the student's undergraduate transcript, a brief description of the proposed research project, and the endorsement of a faculty member in the Sociology Department.

The Honors Thesis

During the senior year, each candidate for honors in sociology enrolls in a yearlong tutorial (SOC 495 and SOC 496) with the faculty member who has agreed to serve as the student's thesis adviser. During the first term of their senior year, students determine the focus of their honors thesis, and submit a 30- to 35-page overview (or, alternatively, a preliminary draft) of the thesis to their adviser. During the second term, they complete their honors thesis and submit final copies to the department.

The text of the honors thesis may not exceed 60 pages except by permission of the honors adviser. Two copies of the honors thesis are due to the undergraduate assistant (316 Uris Hall) during the third or fourth week of April. One of these copies will go to the student's thesis adviser and the other will remain on file in the department.

Any honors candidate whose research directly involves working with human subjects must receive approval for the project from the Cornell University Committee on Human Subjects.

Business and Organizational Studies Concentration

Majors who wish to prepare for postgraduate study in professional schools (business, management, or law) or a career in business or nonprofit organizations may elect to acquire a concentration in Business and Organizational Studies in sociology. This program provides Cornell students with training in economic sociology, organizational
studies, and network analysis, all of which are useful areas of expertise in a world increasingly shaped by economic and social forces of a truly global dimension. In order to complete a concentration in Business and Organizational Studies, students must meet the following requirements:

- complete both core courses in the concentration: SOC 105 and SOC 395
- complete four additional courses from the following list: ILRROB 170, 203, 304, 305, 311, 326/526, 340, 357, 422, 427, 440, 445, 446, and 465

Students completing the concentration receive a letter of recommendation from the chair based on their cumulative academic record in the concentration. Please contact Susan Meyer (undergraduate assistant) or the director of undergraduate studies for additional information on the Business and Organizational Studies concentration.

**Introductory Courses**

**SOC 101 Introduction to Sociology (III) (SBA)**
Fall, spring. 3 credits. Staff.
This course introduces students to the distinctive features of the sociological perspective, as opposed to psychological, historical, or economic approaches. We do so by first discussing the sociological perspective in the context of small groups and face-to-face interaction.

As the course unfolds, we apply the same perspective to progressively larger social groupings, such as peer groups and families, formal organizations, social classes, racial and ethnic groupings, and nation states. The 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 104 Race and Ethnicity**
Spring. 3 credits. E. Brown.
In this course we will study the "social construction" of race and ethnicity. We will explore key concepts such as prejudice, discrimination, segregation, racism, class, status, migration and immigration, identity, civil rights, and color-blindness. The United States is the product of myriad social forces that have produced a unique nation-state that is "racially" and "ethnically" diverse. This course will focus on the experiences of several groups including: whites, blacks, Native Americans, Asian Americans, and Latinos. We will use the perspective of historical sociology to examine the experiences of these different groups and to understand different outcomes in the preindustrial, industrial, and postindustrial periods of American society. This will allow us to uncover the ways in which processes such as settlement, slavery, segregation, immigration and migration, and mobility and immobility have affected race and ethnic relations in the United States.

**SOC 105 Introduction to Economic Sociology (III) (SBA)**
Fall. 3 credits. V. Nee.
Modern social thought arose out of attempts to explain the relationship between economic development and the social transformations that gave rise to the contemporary world. Classical theorists such as 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 theoretical 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 115 Utopia in Theory and Practice (III) (SBA)**
Spring. 3 credits. D. Strang.
People have always sought to imagine and realize a better society, with both inspiring and disastrous results. In this course we discuss the literary utopias of More, Morris, and Bellamy, and the dystopias of Huxley, Orwell, and Zamyatin. We also examine real social experiments, including nineteenth-century intentional communities, twentieth-century socialisms and religious cults, and modern social 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 202 Population Dynamics (also D SOC 201) (III) (CA)**
Spring. 3 credits. P. Eloundou-Enyewe.
For description, see D SOC 201.

**SOC 206 International Development (also D SOC 205) (III) (HA)**
Spring. 3 credits. T. Pinch.
For description, see D SOC 205.

**SOC 207 Problems in Contemporary Society (SBA)**
Fall. 4 credits. B. Wejnert.
This course examines contemporary social problems, with a focus on their sources in the organization of society. Modern societies are based on three fundamental types of institutions—social norms, hierarchies, and markets. Each is subject to distinctive types of failures resulting in problems that include poverty, prejudice and discrimination, intolerance and hate, alcohol and drug abuse, physical and mental illness, crime and delinquency, and urban problems. In analyzing these problems we emphasize the institutions through which they are created and perpetuated and the form of institutional change required to address them.

**SOC 208 Social Inequality (III)**
Spring. 4 credits. K. Weeden.
This course reviews contemporary approaches to understanding social inequality and the processes by which it comes to be seen as illegitimate, 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 factors 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 210 What Is Science? (also S&T S 201) (III) (CA)**
Spring. 3 credits. T. Pinch.
For description, see S&T S 201.

**SOC 215 Organizations: An Introduction (SBA)**
Spring. 4 credits. P. McLaughlin.
Organizations provide the context for much of our everyday life and are important not only in their own right but for their impact on our individual and collective choices. This course introduces the sociological study of organizations from both local teams to multinational corporations. Main issues include socialization and group processes within work settings; management from the perspective of the manager as the manager; the organization as a site of inequality and mobility; organizational decision making; efforts to modify organizations by reforming bureaucracy and hierarchy; and comparison across nations.

**SOC 220 Consumerism and Modernity (SBA)**
Spring. 3 credits. B. Vasi.
For description, see department office.

**SOC 221 Inequality and Social Science (III) (SBA)**
Fall. 4 credits. 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.

**SOC 222 Controversies about Inequality (also PAM 222, ILRROB 222, PHIL 195, D SOC 222 and GOVT 222)**
Spring. 1-3 credits. Staff.
This course 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 faculty who take opposing positions on pressing inequality-relevant issues (e.g., welfare reform, school vouchers, immigration policy, affirmative action). Although this course is required for students in the Inequality Concentration, it is also open to other students who have completed prior course work relevant to issues of inequality.

Soc 230 Knowledge and Power (SBA)
Spring. 3 credits. K. Wyskica.
For description, see department office.

Soc 248 Politics and Culture (also GeovT 363) (III) (Ha)
Fall. 4 credits. M. Berenz. The course 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 will supplement readings.

Soc 251 Aging and the Life Course (also HD 251) (III)
Fall. 3 credits. E. Wethington.
For description, see HD 251.

Soc 265 Latinos in the United States (also CRP 201 and D Soc 265) (III) (SBA)
Spring. 3 credits (4-credit option available). M. H. Veliz.
This course is an exploration and analysis of the Hispanic experience in the United States. It 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 270 Gender: Meanings and Practice (also FGS 27 27)
Spring. 3 credits. S. Correl.
People have many ideas about gender—about women, men, femininity, and masculinity. These ideas organize our social lives in important ways, but often in ways that we do not even notice. They are often so taken for granted that we simply assume they are part of the "normal" or natural way that life works. As part of its focus, sociology investigates and exposes these beliefs about social life that are usually taken for granted. In this course, we will critically examine the ways that gender structures the social world in which we live. After laying the theoretical groundwork, we will explore conceptions about gender, paying special attention to how beliefs about masculinity and femininity create and enforce a system of gender difference and inequality. We will then attempt to reveal the "common sense" world of gender that surrounds us by exposing the workings of institutions, such as the family, the classroom, and the workplace. Next, we will explore how gender stereotypes and the interactions between men and women create and recreate gender. We will then briefly examine the link between gender, friendship, and sex/sexuality. We will conclude by considering the possibilities of a "degendered" or less-gendered society.

Soc 280 Social Movements (SBA)
Spring. 3 credits. B. Vasi.
For description, see department office.

Soc 293 Inequality, Diversity, and Justice (also CRP 293, GeovT 293, Phil 193) (III) (IV) (COM)
Fall. 4 credits. No pre-requisites intended for freshmen and sophomores. R. Miller.
An interdisciplinary discussion of the nature and moral significance of social inequality, diversity, and poverty and of the search for just responses to them. How unequal are economic opportunities? What are the causes of poverty? To what extent is greater equality a demand of justice? Are traditional welfare programs an appropriate response to poverty? What special significance have race and gender as sources of inequality? Do they merit special remedies such as affirmative action? How should governments deal with religious diversity and other differences in ultimate values? For example, should abortion statutes be neutral toward rival views of the importance of potential human life? What are the causes of worldwide inequality? To what extent do people in per-capita rich countries have a duty to help the foreign poor? Moral arguments, investigations of social causes, and legal reasoning interact in the search for answers to these questions. To provide these resources, the course is taught by leading faculty professors in philosophy, political theory, the social sciences, and law.

Methods and Statistics Courses

Soc 301 Evaluating Statistical Evidence
Fall. 4 credits. Substitutable courses for SOC 301: AEM 210, BTRY 301, ECON 319, ILRST 210, MATH 171 or PSYCH 350, PAM 210, and SOC 303. For sociology majors only.

Soc 303 Design and Measurement (SBA)
Spring. 4 credits. D. Harris.
Research methods are the foundation upon which all research is built. This course will cover the principles of research design and methodology. We will discuss the nature of scientific inquiry, the importance of validity and reliability, the construction of logical arguments, and the role of developing hypotheses. We will also cover the statistical tools used for the design and analysis of research projects. The course will be taught using hands-on learning techniques, including computer simulations and group projects.

Soc 304 Social Networks and Social Processes (III) (SBA)
Fall. 4 credits. D. Strang.
How do groups self-segregate? What leads cultural fashions to rise and fall? How do rumors spread? How do communities form and police 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. We focus on models that can be explored through computer simulation and improved through observation.

Soc 305 Macro Organizational Behavior (also ILROB 171)
Spring. 3 credits. Staff.
For description, see ILROB 171.

Intermediate Courses

[Soc 309] The Sociology of Marriage (also SOC 309) (III) (SBA)
Spring. 4 credits. Not offered 2004-2005. Contemporary debate on the nature of the family in the United States often assumes a simplistic decay of the "traditional marriage." This course unpacks the myths and facts that undergird this model. We overview the historical patterns of marriage in the United States, examine data on contemporary union formation and dissolution and the consequences, and explore various theoretical models of marriage and its decline.

[Soc 311] Group Solidarity (also ILROB 321) (III)
What is the most important group that you belong to? What makes it important? What holds it together? How do groups self-segregate? What leads to social movements? This course explores the search for just responses to them. How unequal are economic opportunities? To what extent is greater equality a demand of justice? Are traditional welfare programs an appropriate response to poverty? What special significance have race and gender as sources of inequality? Do they merit special remedies such as affirmative action? How should governments deal with religious diversity and other differences in ultimate values? For example, should abortion statutes be neutral toward rival views of the importance of potential human life? What are the causes of worldwide inequality? To what extent do people in per-capita rich countries have a duty to help the foreign poor? Moral arguments, investigations of social causes, and legal reasoning interact in the search for answers to these questions. To provide these resources, the course is taught by leading faculty professors in philosophy, political theory, the social sciences, and law.

[Soc 316] Gender Inequality (also FGSS 316) (III) (SBA)
Fall. 4 credits. Not offered 2004-2005. Staff.
This course offers a comprehensive overview of historical and contemporary patterns of gender stratification. The first few weeks are devoted to the examination of different ideas (biological, functionalist, feminist) about gender inequality. The remainder of the course involves both theoretical analyses and empirical investigations of four substantive areas: the historical development of gender stratification, the nature of gender inequality in contemporary society, cross-national comparison of gender inequality, and strategies for social change. Specific topics
include division of labor between men and women; relationship between social class and gender; dynamics of occupational sex segregation; gender differences in social mobility, socialization, and educational attainment; and race and gender differences in national and international variations in gender inequality. Each section includes examination of key theoretical debates and a survey of recent feminist research that is relevant to those debates.

**[SOC 320 Globalization and Inequality (III) (SBA)]**
What is globalization and where is it taking us? The objective of the course is to explore the impact of globalization on patterns of social inequality. We begin the semester by considering what the term “globalization” means. We then explore competing accounts of this world-wide trend (e.g., modernization; world-system; post-modernity) and examine the various ways in which contemporary patterns of globalization are different from historical patterns of industrialism. The second part of the semester takes on theoretical and empirical investigations of the way in which globalization has shaped the international division of labor and the structure of class, relationships, gender inequality, racial and ethnic relations, migration, poverty, social networks, and indigenous world cultures.

**[SOC 322 Service Learning (also ILROB 322)]**
For description, see ILROB 322.

**[SOC 324 Environment and Society (also SSTS 324 and D SOC 324) (III) (SBA)]**
Fall. 3 credits. Staff.
For description, see D SOC 324.

**[SOC 326 Social Policy (also SOC 526) (III)]**
Fall. 4 credits. S. Caldwell.
The dramatic growth of the policy research sector as an analytical and intellectual force signals the changing relationship of social science to social policy in the United States. With an eye on that relationship, this course examines the development of social policy in selected areas of social structure of class, families, social programs, poverty, housing, crime, and health. The policy research sector itself—people, values, and institutions—is also surveyed.

**[SOC 327 Extremism and Tolerance in Contemporary Society (SBA)]**
Spring. M. Berenzon.
For description, see department office.

**[SOC 330 Sociology of Sport (SBA)]**
Fall. 4 credits. T. Sorek.
This course introduces students to major theoretical perspectives in the sociology of sports, with a particular emphasis on the construction of collective identities (e.g., national, ethnic, civic, religious, local, and gender). The theoretical debates are illustrated by case studies from the Americas, Europe, Africa, India, and the Middle East.

**[SOC 341 Modern European Society and Politics (also GOVT 341) (III) (SBA)]**
Spring. 4 credits. S. Tarrow.
For description, see GOVT 341.

**[SOC 352 The Sociology of Contemporary Culture (also SSTS 354) (III) (CA)]**

This course introduces the rapidly expanding field at the intersection of sociology and cultural studies. It provides an introduction to theoretical debates in cultural studies and to sociological studies of popular culture. We discuss the relationship between the iconic and the cultural, the significance of consumption in modern life, narratives in popular films, the culture of music and art, the role of rhetoric in social life, cultural analyses of science, and the social construction of self, bodies, and identities.

**[SOC 357 Schools, Race, and Public Policy (SBA)]**
Spring. 4 credits. S. Morgan.
After an examination of alternative theories of the development and changing function of educational institutions in society, this course examines explanations for why individuals obtain educational training, how an individual’s family background and race affect his or her trajectory through the educational system, and how and why society confers advantages and disadvantages upon individuals. Following a review of recent empirical research on effective schools, the course concludes with an examination of current policy debates in the United States, focusing primarily on school choice, vouchers, and financial aid for a college education.

**[SOC 358 Immigration, Capitalism, and Inequality (SBA)]**
For description, see department office.

**[SOC 371 Comparative Social Stratification (also D SOC 370) (III) (SBA)]**
Fall. 3 credits. S. Feldman.
For description, see D SOC 370.

**[SOC 375 Classical Theory (SBA)]**
Fall. 3 credits. R. Swedberg.
An introduction to the classics in sociology, primarily works by Karl Marx, Max Weber, Emile Durkheim, and Georg Simmel. We will also be studying the works of Alexis de Tocqueville, Montesquieu, and Joseph Schumpeter. Special emphasis will be put on the concepts, ideas, and modes of explanation that characterize the classics. We will also look for the underlying assumptions of the classics and consider the role that social and historical events may have played in determining their construction of the classics. The requirements include active class participation and three tests in class.

**[SOC 390 Israeli-Palestinian Conflict (also NES 395 and JWST 395) (III) (SBA)]**
Spring. 4 credits. T. Sorek.
The course introduces students to the major themes in contemporary Israel–Palestine conflict, focusing on the following: the tension between the definition of Israel as a Jewish state and its aspiration to be democratic, the place of religion in politics, the effects of the long-term occupation of the West Bank and the Gaza Strip, the fragile status of the Arab Palestinian citizens of Israel, civil–military relations, intra-Jewish ethnic divides, and gender relations.

**[SOC 395 Advanced Economic Sociology (SBA)]**
Spring. 4 credits. R. Swedberg.
This course aims at reinforcing and adding to the insights presented in SOC 105 (Introduction to Economic Sociology, taught by Professor Victor Nee in the fall). The course begins with the theoretical foundation of economic sociology (classical and modern). The contributions by Max Weber, Joseph Schumpeter, Mark Granovetter, and others will be presented. This section is followed by lectures on different types of economic organization, from capitalism and the global economy to the firm and entrepreneurship. Thereafter, the section on institutions and the economy, law and the economy, culture and the economy, and gender and the economy will then be discussed. Normative aspects of economic sociology are also on the agenda.

**[SOC 397 Israeli-Palestinian Conflict (also NES 397)]**
Fall. 4 credits. Requirements: three knowledge quizzes, a midterm paper, a movie report, active participation in the course web site forum, and a final exam. T. Sorek.
This course introduces students to the complexity of the Israeli–Palestinian conflict in its various dimensions: national, religious, economic, and cultural. It outlines the history of the conflict from the beginning of Zionist immigration to Palestine in the late nineteenth century until the current day. The course juxtaposes the different subjective points of view and motivations of the various actors involved and analyzes the sociopolitical process as products of these interrelated positions. In addition, the course examines the internal structures of both societies and how they are influenced by the dynamics of the conflict. Special emphasis is given to the significance of interdependency of culture and politics, national symbolism as both product and cause of the conflict and an element that maintains it; the significance of heroism, victimhood, and martyrdom in shaping the conflict and the identities of the parties involved.

**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 400-level courses is an introductory course plus 301 (or an equivalent statistics course). Students who are not sure whether they are ready for a 400-level course are encouraged to consult the professor.

**[SOC 408 Qualitative Methods (also SOC 508) (III) (SBA)]**
This course aims to acquaint students with the practice of non-quantitative research methods. Rather than offering a laboratory of techniques, it asks students to think about how particular methods are more or less suited to answering particular types of research questions. The course is divided into four parts: 1) 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 410 Health and Survival Inequalities (also FGSS 410)]**
Fall. 4 credits. A. Basu.
This course reviews the ways of measuring inequalities such as life expectancy, age-specific death rates, cause-specific mortality and morbidity, and disability and their historical and contemporary socioeconomic markers, including region, class, race, gender, and age. It then examines some of the
determinants of these differences, particularly biology, poverty, and politics, as well as the role of medical advances in promoting or reducing health inequalities. The course also covers some of the growing literature on individual and family behaviors that impinge on inequality in health and survival—both unintentional (through differences in lifestyle, for example) as well as deliberate (through active discrimination against certain categories of individuals, for example, girls in parts of Asia). Policy prescriptions arising from these studies will be evaluated for feasibility and effectiveness and new innovative approaches proposed.

SOC 412 Seminar in Sociology of Gender (also SOC 512) (SBA)
Spring. 4 credits. Undergraduates must get instructor permission to enroll. S. Correll.
For description, see SOC 512.

SOC 421 Theories of Reproduction (also FGSS 410, D SOC 410)
Spring. 4 credits. A. Basu
This course examines the changing nature of the debate on what makes populations grow and what makes families have any, few, and many children. The course begins with theories of historical population growth and changing fertility and then moves on to consider the economic, social, cultural, political, and biological theories applied to fertility and changing fertility in contemporary populations. Demographic concepts and factors believed to account for the high fertility of many developing country populations and the extremely low fertility in many parts of the developed world are examined. Emphasis is given to "sociocultural" and "gender-based" explanations of reproductive behavior, which activist groups and organizations have used to push political and social agendas. The course pays particular attention to the role of the state in population growth and its place in women's lives.

SOC 422 Sociology of Markets (also SOC 622, ILROB 622)
3 credits. M. Lounsbury.
For description, see ILROB 622.

SOC 425 Artificial Societies (also SOC 527)
Fall. 4 credits. 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 student to program in Delphi and gives them simulation programs to modify as a class project.

[SOC 427 The Professions: Organization and Control (also ILROB 427) (III)]
Fall. 3 credits. Prerequisite: permission of the instructor. Not offered 2004–2005. P. Tolbert.
For description, see ILROB 427.

SOC 437 Social Demography (also D SOC 438) (III) (SBA)
Fall. 3 credits. D. Gurak.
For description, see D SOC 438.

SOC 442 Sociology of Science (also S&TS 442) (III) (SBA)
Fall. 4 credits. H. Mader.
For description, see S&TS 442.

SOC 445 Entrepreneurship and Organizations (also ILROB 673)
M. Lounsbury.
For description, see ILROB 673.

[SOC 446 Economic Sociology (also SOC 646)]
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 study of markets, organizations, and economic exchange.

[SOC 457 Health and Social Behavior (also HD 457) (III)]
Fall. 3 credits. Prerequisites: HD 250, SOC 101, D SOC 101, or SOC 251 and a course in statistics. Letter grades only. Not offered 2004–2005. E. Welton.
For description, see HD 457.

SOC 465 Dynamics of the Social Sector (also ILROB 624)
M. Lounsbury.
For description, see ILROB 624.

[SOC 470 Theories of the Family and the Life Course (also SOC 570) (III) (SBA)]
This seminar examines theoretical frameworks for understanding the family and the life course. Foci include the dynamics of role transitions and normative role trajectories, linkages across the various domains of individual lives (such as work and family), the interplay of individual and historical times, the social significance of age, and the linkages between individuals and the families and other social contexts they live in. We briefly consider various methodological challenges associated with putting these theoretical perspectives into practice.

SOC 491 Independent Study
Fall or spring. 1–4 credits. This is for undergraduates who wish to pursue research experience or to do extensive reading on a special topic. Permission to enroll for independent study will be 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 term. Graduate students should enroll in 891–892.

SOC 495 Honors Research
Fall or spring. 4 credits. Limited to sociology majors in their senior year. Prerequisite: permission of instructor.

SOC 496 Honors Thesis: Senior Year
Fall or spring. 4 credits. Prerequisite: SOC 495.

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 501 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 502 Basic Problems in Sociology II
Spring. 4 credits. Staff.
Continuation of SOC 501. 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 505 Research Methods I: The Logic of Social Inference]
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 506 Research Methods II
Spring. 4 credits. S. Morgan.
This is a 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 credidle assumption that the most important fundamentals of data analysis techniques can be taught in the context of simple 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. Interpersed with this material, the course addresses complications of regression modeling for the practicing researcher including: regression 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.

SOC 507 Research Methods III
Fall. 4 credits. Staff.
Introduction to the general linear model for discrete outcomes. Discussion of principles of estimation, model selection, coefficient interpretation, specification error, and fit assessment. The first half of the course covers logistic regression, probit, log-linear, and latent class models, while the second half of the course covers event history models. Although the statistical theory underlying these models is reviewed, issues of interpretation and estimation typically take precedence. Emphasis is accordingly placed on the analytic issues that arise in writing research papers with models of this kind.
Graduate Seminars
These seminars are primarily for graduate students but may be taken by qualified advanced undergraduates with permission of the instructor. The seminars offered in each term 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 term.

[SOC 508 Qualitative Methods (also SOC 408)]
For description, see SOC 408.

[SOC 509 The Sociology of Marriage (also SOC 309, FGSS 309, FGSS 509)]
For description, see SOC 309.

SOC 510 Seminar on Comparative Societal Analysis
Spring 3 credits. Open to advanced graduate students throughout the social sciences, with permission of instructor. M. Berezin.
This seminar is 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 enroll 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 512 Seminar in Sociology of Gender (also SOC 412)
Spring. 4 credits. S. Correll.
One of the important achievements in gender knowledge in the last decade is the revolution in our conceptualization of what gender is as a social phenomenon. There is increasing consensus among gender scholars that gender is not primarily an identity or role that is taught in childhood and enacted in family relations. Instead, gender is an institutionalized system of social practices for constituting people as two significantly different categories—men and women—and organizing social relations of inequality on the basis of that difference. We will begin with an examination of the key theoretical works in sociology that address this conceptualization. We will then apply these theoretical approaches as we explore the processes by which gender difference and inequality are maintained or changed in contemporary American society. While we will examine key social processes at multiple levels of analysis, our primary focus will be on processes that occur at the interactional level. Our goal will be to understand both how gender shapes what happens in interaction and how what happens in interaction affects gender difference and inequality. We will examine these interactional processes in specific social institutions, including schools, families, and work.

[SOC 518 Social Inequality: Contemporary Theories, Debates, and Models]
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 519 Workshop on Social Inequality
Spring. 4 credits. K. Weeden.
This workshop provides a forum for students, faculty, and guest speakers to present and discuss their current research projects related to social inequality.

SOC 525 Social Policy (also SOC 326)
Fall. 4 credits. S. Calabrese.
For description, see SOC 326.

SOC 527 Artificial Societies (also SOC 425)
Fall. 4 credits. M. Macy.
For description, see SOC 425.

[SOC 528 Conflict and the Nation-State]
The nation-state developed out of conflict, through military competition within Europe and the rise of and response to colonial empires in the Americas, Asia, and Africa. Conflict is just as virulent today, as ethnic cleansing and movement toward American imperialism attest. We will examine 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 politics, 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 nationality and of global institutions, and inequalities of wealth and power?

SOC 532 Inside Technology: The Social Construction of Technology (also S&T 532)
Fall. 4 credits. G. Gillespie.
For description. see S&T 532.

SOC 540 Organizational Research
Fall. 4 credits. D. Straub.
This seminar focuses on contemporary sociological research on organizations. It centers theoretically on the interplay of institutional, ecological, and choice-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 550 Seminar on Max Weber and Joseph Schumpeter

[SOC 560 New Institutionalism in Economic Sociology]
For description, see department office.

[SOC 570 Theories of the Family and the Life Course (also SOC 470)]
This course provides an analysis of the theoretical approaches informing sociological understandings of the family and the human life course. Approaches include power and exchange models; interactionism; the new home economics, and life course approaches. Emphasis is on understanding the conflict and congruence between existing theoretical frameworks, and on translating theoretical issues into empirical research questions.

SOC 591 Special Seminars in Sociology
Fall and spring. 2–4 credits. Staff.
These graduate seminars are offered irregularly. Topics, credit, and instructors vary from semester to semester. Students should look at the Sociology Department bulletin board at the beginning of each semester for current offerings.

SOC 595 The Sociological Classics
Spring. 3 credits. R. Swedberg.
This course is primarily intended for graduate students who lack a background in the classics as well as for those who are already familiar with elementary works, such as Weber's The Protestant Ethic, Durkheim's Rules of Sociological Method, and Marx and Engels' The Communist Manifesto. While the lectures will include a discussion of the former, the readings will emphasize works such as Weber's Economy and Society, Durkheim's Elementary Forms of Religious Life, and Marx's Capital. Works by Tocqueville and George Simmel are also part of the reading list. The main purpose of the course is to make the student familiar with the concepts, ideas, and modes of reasoning that characterize the mature works of the classics. Each meeting will consist of lecture and discussion. The requirements include active class participation and a research paper on some aspect of the classic.

SOC 606–607 Sociology Colloquium
Fall and spring. No credit. Required of all sociology graduate students. Staff.
A series of talks representative of current research interests in sociology, given by distinguished visitors and faculty members.

SOC 608 Proseminar in Sociology
Fall. 1 credit. Enrollment restricted to 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 615 Politics in Market Society (SBA)
Fall. 4 credits. D. Wegner.
For description, see department office.

SOC 631 Qualitative Research Methods for Studying Science (also S&T 631)
Spring. 4 credits. T. Pinch.
For description, see S&T 631.

SOC 646 Economic Sociology (also SOC 446)
For description, see SOC 446.
SOC 660  States and Social Movements (also GOVT 660)
Fall. 4 credits. S. Tarrow.
For description, see GOVT 660.

SOC 680  Workshop on Transnational Contention (also GOVT 681)
Spring. 4 credits. S. Tarrow.
For description, see GOVT 681.

SOC 691  Independent Study
Fall or spring. 2–4 credits. Prerequisite: graduate status and permission of a faculty member willing to supervise the 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 will be 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 term.

SOC 778  Solidarity in Groups (also ILROB 778)
Fall. 3 credits. E. Lawler.
For description, see ILROB 778.

SOC 891–892  Graduate Research
891, fall; 892, spring. Up to 4 credits each term. Prerequisite: graduate status and permission of a faculty member willing to supervise the project.

SOC 895–896  Thesis Research
895, fall; 896, spring. Up to 6 credits each term. Prerequisite: permission of thesis supervisor.

SOUTH ASIA PROGRAM
The South Asia Program coordinates research, teaching, and special campus events relating to Bangladesh, India, Pakistan, Sri Lanka, Nepal, and 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 rural 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 M.C. 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 take a concentration 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 doctoral degree in a discipline such as history, history of art, anthropology, government, 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, 255–4993. www.einaudi.cornell.edu/SouthAsia.

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. Fourteen 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 rural 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 M.C. 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 take a concentration 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 doctoral degree in a discipline such as history, history of art, anthropology, government, 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, 255–4993. www.einaudi.cornell.edu/SouthAsia.

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 section "Interdisciplinary Centers, Programs, and Studies" in the front of this catalog.

SPANISH
See Department of Romance Studies.

SWAHILII
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 & 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 majors in each of those areas. These majors educate students in accordance with the general liberal arts ethic of the college. The department 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, playwriting, acting, directing, design/technology, and stage management. Students interested in the Theatre Arts major should consult with Alison Van Dyke (director of undergraduate studies, Theatre, Film & Dance).

**Theatre major requirements**

1) THETR 240 and THETR 241, and THETR 242 (three-semester introduction to World Theatre) 8

2) Four laboratory courses distributed as follows:
   - THETR 151 Production Lab I 1-3
   - THETR 153, THETR 253, or THETR 353 Stage Management Lab I, II, or III 1-3
   - THETR 155 Rehearsal and Performance or THETR 151 in a different area 1-3
   - THETR 251 or THETR 351 Production Lab II or III 1-4

3) Three courses in the area of Theatre Studies (see Theatre Studies section of theatre courses) chosen in the following manner:
   - one course must be at 300 level
   - one course must be at 400 level
   - one additional course at the 300 or above level
   - one of the three courses must be pre-twentieth century.

4) Three courses (at least 9 credits) in other theatre courses chosen in consultation with the faculty adviser. Course taken to fulfill this requirement.

5) Courses in which a student receives a grade below "C" cannot be used to fulfill the requirements for a Theatre major.

**Honors**

The Theatre honors program is for majors who have demonstrated exceptional ability in the major and who seek an opportunity to explore branches of their subject not represented in the regular curriculum or to gain experience in original research. To be part of the honors program the student must maintain a GPA of 3.5 in classes for the theatre major and an average of 3.0 in all courses. Students must consult with their advisers 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 AUTF 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 please see listing of courses at end of departmental listings.) Approval process will include 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.

**Independent Study, Internships and Honors**

THETR 300 Independent Study Fall, spring, or summer. 1-4 credits.

THETR 495 Undergraduate Internship Fall, spring, or summer. 1-3 credits.

THETR 496 Honors Research Tutorial Fall, spring. 4 credits. Limited to Honors students in Theatre, Film and Dance. This course is the first of a two-semester sequence (the second is THETR 496) for seniors engaged in an honors project.

THETR 497 Honors Research Tutorial Fall or spring. 4 credits. Limited to Honors students in Theatre, Film and Dance. This course is the second of a two-semester sequence (the first is THETR 495) for students engaged in an honors project.

**First-Year Writing Seminars**

Consult the John S. Knight Institute brochure for times, instructors, and descriptions.

**General Survey Courses**

THETR 230 Creating Theatre (IV) (LA) Spring. 3 credits. Limited to 25 students. D. Hall and faculty.

THETR 446 Undergraduate Internship Fall or spring. 4 credits. Limited to Honors students in Theatre, Film and Dance. This course is the second of a two-semester sequence (the first is THETR 495) for students engaged in an honors project.

**Theatre Studies**

THETR 203 Sophomore Seminar: Shakespeare in (con)Text (also THETR 446 and VISST 446) # (IV) (LA)

THETR 206 Introduction to Black Theatre (also AS&RC 206) Spring. L. Grady-Willis.

THETR 207 Black Theatre (also AS&RC 207) Spring. 3 credits. Limited to 16 students. L. Grady-Willis.

**Course Descriptions**

- **THETR 230 Creating Theatre (IV) (LA)**
  - Spring. 3 credits. Limited to 25 students. D. Hall and faculty.
  - An introduction to theatrical production for the nonmajor. Students develop a new critical perspective of the performing arts by examining the creation of theatre onstage and backstage through lectures, demonstrations, discussions with various faculty, and staff at the Schwartz Center, and by attending department productions. Some writing is required.

- **THETR 203 Sophomore Seminar: Shakespeare in (con)Text (also THETR 446 and VISST 446)** # (IV) (LA)

- **THETR 206 Introduction to Black Theatre (also AS&RC 206)**
  - Spring. 4 credits. Limited to 16 students. L. Grady-Willis.

- **THETR 207 Black Theatre (also AS&RC 207)**
  - Spring. 3 credits. Limited to 16 students. L. Grady-Willis.
THETR 240 Introduction to World Theatre I—Antiquity to 1500 @ 
Spring. 4 credits. S. Warner. 
A survey of practices, literatures, and themes of theatrical performance in Africa, America, Asia, and Europe from antiquity to around 1500. We will examine case studies from ancient Egypt, Greece, Rome, the Near East, and India; and medieval and feudal Indonesia, China, Japan, and England; continuing up to the age of European colonialism. We will look at issues of masking and identity, storytelling and ritual, stage and society, tradition and modernity. Lectures will be combined with periodic student projects.

THETR 241 Introduction to World Theatre II—Early Modernity @ 
Fall. 4 credits. S. Warner. 
A survey of world theatrical performance from around 1500 to 1800. We will examine the development of European and Asian vernacular and national theatrical traditions: recent ethnic and popular performance traditions of Asia, Africa, and meso-America; recurring issues of realism and theatricalism, innovation and nostalgia, and colonial expansion and marginalization. Lectures will be combined with periodic student projects.

THETR 242 Introduction to World Theatre III—1800 to the Present @ 
This course will trace the emergence of theatrical modernity as a global phenomenon. In Europe and North America, we will trace the progression from romanticism through realism and the modernist avant-gardes, to post-modernism and beyond. We will trace the emergence of recent performance traditions in Asia and Africa in response to local and global forces, and the emergence of an increasingly global and intercultural economy of world theatre. Lectures will be combined with periodic student projects.

THETR 273 Opera (also MUSIC 274) @ 
Fall. 3 credits. A. Groos. 
An introduction to opera through the examination of six or seven major works of the operatic repertoire by such composers as Handel, Mozart, Verdi, Offenbach, Wagner, Puccini, and Britten, with attention to the interaction of the words, music, and visual elements. We will compare some of the different productions available on video and DVD recordings.

THETR 278 Desire (also ENGL 276, COM L 276, FGSS 276) @ 
Spring. 4 credits. E. Hanson. 
Sexual desire is a series of scripted performances, a set of stories we tell ourselves about ourselves. Through a critical discussion of "these pleasures which we lightly call physical," to borrow a phrase from the French novelist Colette, we might discover a deeper appreciation for the strange narrative of someone else's desire, and perhaps even the strange narrative of our own. We begin with the theory that desire has a history, even a literary history, and we will examine classic texts in some of its most influential modes: Platonic, Christian, romantic, decadent, psychoanalytic, feminist, and queer. This course is an introductory survey of European dramatic texts from Plato and Aristophanes to Jean Genet and Caryl Churchill; and it is also a survey of the most influential trends in theory and sexual politics, including the work of Freud, Foucault, Barthes, and various feminists and queer theorists. Topics for discussion include Greek pedantry, sublimation, hysteria, sadomasochism, homosexuality, pornography, cybersex, feminism, and other literary and performative pleasures, and the focus is always on expanding our critical vocabulary for considering sex and sexual desire as a field of intellectual inquiry.

THETR 319 Music, Dance, and Light (also DANCE 319 and VISST 319) @ 
Fall. 3 credits. Attendance at dance concerts and music concerts is required. A. Vogelsang and F. Intemann. 
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 recorded video recordings, and performances. Some classes devoted to creating sound, movement, and lighting.

THETR 322 Russian Drama and Theatre (also RUSSL 332) @ 
For description, see RUSSL 322.

THETR 325 Queer Performance (also FGSS 325) @ 
What constitutes queer performance? Is queer who you are or what you do? Is sexuality all we mean by queer? Has queer performance enhanced or eclipsed gay and lesbian theater? This course investigates the polymorphously perverse relationship between queer theory and performance. Integral to our theoretical discussions are questions of practice and production. Where is queer performance staged and how is it received? How is it produced, for whom, by whom, and with what funds? What is the relationship between politics and performance? Students are expected to attend at least one performance outside of class and to collaborate on an in-class performance.

THETR 333 European Drama 1660–1900: Moliere to Ibsen (also ENGL 335 and COM L 336) @ 
For description, see ENGL 335.

THETR 335 Modern Western Drama, Modern Western Theatre: Theory and Practice (also COM L 335, VISST 335) @ 
This course explores major American playwrights from 1900 to 1990, introducing students to American theater as a significant part of modern American cultural history. Our focus is to consider the ways in which theater has contributed to the construction and deconstruction of a national identity. We 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 theatre canon. Authors include O'Neill, Glaspell, Oedets, Rice, Holland, Hughes, Hurston, Hansberry, Miller, Williams, and Albee.

THETR 345 The Tragic Theater (also CLASS 345 and COM L 344) @ 
Spring. 4 credits. Limited to 40 students. F. Ahl. 
For description, see CLASS 345.

THETR 372 Medieval and Renaissance Drama (also ENGL 372/677) @ 
For description, see ENGL 372.

THETR 373 English Drama from 1700 to the Present (also ENGL 373) @ 
For description, see ENGL 373.

THETR 374 Opera and Culture (also GERST 374 and MUSIC 374) @ 
Spring. 4 credits. M. Pachner. 
For description, see ENGL 375.

THETR 404 Mythology and Postmodern Performance (also THETR 604, VISST 404) @ 
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 class investigates the critical potentiality mythology holds for both performance theory and social activism. Specifically, we look 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 mimesis as a discursive and performative
Theatricality (IV) (LA)

This course examines how collaboration between director, designer, and performers leads to differing interpretations of plays. The course focuses on the choices available to the actor, director, and designer in the process of developing theatre pieces. Participants will be expected to read a variety of sources on the theory and methods of theatrical representation, as well as to work in workshop format as actors and writers. The course aims at initiating students into the practice of Aristotle to the present. Although covering a span of over two thousand years, the course will be focused on a smaller number of key representative texts from the European, American, and postcolonial traditions. In so doing, we will seek to develop a framework for an understanding of the context in which theatre emerged as well as its 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.

THEATRE 431 Theory of the Theatre and Drama (also COM L 405 and GERST 431) (IV) (LA)

Fall. 4 credits. D. Bathrick.

The course is a survey of dramatic theory and theories of theatrical representation from Aristotle to the present. Although covering a span of over two thousand years, the course will be focused on a smaller number of key representative texts from the European, American, and postcolonial traditions. In so doing, we will seek to develop a framework for an understanding of the context in which theatre emerged as well as its 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.

THEATRE 436 The Female Dramatic Tradition (also FGSS 433) (IV) (LA)

Spring. 4 credits. S. Warner.

Is there a "female dramaturgy?" What is the female tradition in the theatre? The course explores these questions through an investigation of texts by women dramatists, including Hrotsvit of Gandersheim, Apha Behn, and Caryl Churchill, as well as their theory by such critics as Sue Ellen Case and Jill Dolan.
THETR 703 Theorizing Film (also ENGL 703 and FRLIT 695) Fall. 4 credits. Not offered 2004–2005. T. Murray. For description, see ENGL 703.

THETR 710 The Pedagogy of Theatre Fall. 4 credits. The taking of this class must coincide with the offering of the relevant undergraduate class, with the permission of the instructor. Staff. This class 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 155 Rehearsal and Performance Fall or spring. 1–2 credits. 1 credit per production experience per semester up to 2 credits per semester. Students must register for the course in the term in which credit is earned. Limited to students who are assigned roles after tryouts at the department’s scheduled auditions. Students should not register in this course only after they have been assigned roles. S-U grades only. The study, development, and performance of roles in departmental theatre or dance productions or the study and practice of directing as experienced in assisting faculty and guest directors.

THETR 205 Rehearsal Workshop Fall or spring. 2 credits. Limited to 30 students. Prerequisites: participation in a particular department production and permission of instructor. Staff. This course is for students participating in a particular production to gain expertise and/or knowledge to contribute to that production. The focus of the class depends on the needs of a particular production (e.g., history, choreography, textwork, dramaturgy).

THETR 280 Introduction to Acting (IV) (LA) Fall or spring. 3 credits. Each section is limited to 16 students. Preregistration and registration only through roster in department office, 225 Schwartz Center. Staff. An introduction to the actor’s technique and performance skills, exploring the elements necessary to begin training as an actor, i.e., observation, concentration, and imagination. Focus is on physical and vocal exercises, improvisation, and text and character. There is required play reading, play attendance, and some scene study.

THETR 281 Acting I (IV) (LA) Fall or spring. 3 credits. Each section limited to 14 students. Prerequisites: THETR 280 and audition. Registration only through roster in department office, 225 Schwartz Center. 281 is restricted to sophomores and above. Practical exploration of the actor’s craft through exercises in physical and psychological action, improvisation and scene study.

THETR 282 Standard American Stage Speech (IV) (LA) Fall. 3 credits. Prerequisites: THETR 280 and permission of instructor. Limited to 10 students. A. Van Dyke. An introduction to Standard American Stage Speech. Study of various regional American accents and Standard American Stage Speech using the International Phonetic Alphabet (IPA) as a tool. A great deal of the class focuses on stage fighting, both unarmed and armed. We use the Society of American Fight Directors’ guidelines of safety and skills.

THETR 283 Voice and Speech for Performance (IV) (LA) Fall. 3 credits. Limited to 12 students. Prerequisites: permission of instructor. Not offered 2004–2005. Staff. Registration only through department roster 225 Schwartz Center. Development of the speaking voice with additional emphasis on dramatic interpretation.

THETR 284 Speech and Dialects for Performance (IV) (LA) Spring. 3 credits. Limited to 10 students. Primarily for department majors. Prerequisites: THETR 281 and permission of instructor. A. Van Dyke. Development of speech and dialects in dramatic text.

THETR 280 Acting II (IV) (LA) Fall. 3 credits. Prerequisite: THETR 281 and audition. Limited to 12 students. S. Cole. A continuation of Acting I. Special consideration is given to a physical approach to characterization.

THETR 381 Acting III: Advanced Scene Study (IV) (LA) Spring. 3 credits. Prerequisite: audition. Strong preference given to those who have taken THETR 466. Limited to 10 students. B. Miles. This course focuses on advanced problems for the stage: Monologues and scenes are drawn from Shakespeare and classical sources.

THETR 384 Commedia: A Contemporization of Physical Acting Styles and the Comic Approach (IV) (LA) Spring. 3 credits. Prerequisite: THETR 281 and permission of instructor. Limited to 10 students. Not offered 2004–2005. B. Miles. A wholly physical acting class based in the practices of Commedia dell’arte—stock characters, physical lazzi, improvisation, street theatre—utilizing improvisation, some mask work, clown and viewpoint training. An exploration of how to use the body to illuminate text, and how to mine text to maximize comedy.

THETR 385 Advanced Studies in Acting Techniques (IV) (LA) Fall. 3 credits. Prerequisites: THETR 281, and permission of instructor. Limited to 10 students. For fall: solo performance. May be repeated for credit. B. Levitt.

THETR 387 Movement for the Actor Fall. 3 credits. Prerequisites: THETR 281 and permission of instructor. Limited to 10 students. Not offered 2004–2005. Faculty. Physical skills for the actor are developed through work with LeCoq-based Neutral Mask corporeal name and physical acting techniques.

THETR 388 Stage Combat Spring 3 credits. Permission of instructor. Limited to 8 students. This is a class based on movement and physical work for the actor. Students learn

Directing

THETR 177 Student Laboratory Theatre Company Spring. 1–2 credits. The Student Laboratory Theatre Company is a group of student-actors who earn credit by acting in three scenes directed by students taking THETR 498. Students enrolling in SLTC for credit will earn 1 credit for 2 projects and 2 credits for 3 projects. SLTC also meets with directors once a week.

THETR 289 Fundamentals of Directing (also VISST 398) (IV) (LA) Fall. 3 credits. Limited to 9 students. Prerequisites: permission of instructor. Special consideration is given to students who have completed THETR 280 or are intending to continue in the area of stage or screen directing. Students should see instructor one year in advance to sign up for course. D. Feldshuh. Focused, practical exercises teach the student fundamental staging techniques that bring written text to theatrical life. A core objective is to increase the student’s awareness of why and how certain stage events communicate effectively to an audience. Each student directs a number of exercises as well as a short scene.

THETR 498 Fundamentals of Directing II (IV) (LA) Spring. 4 credits. Enrollment strictly limited. Prerequisite: THETR 280 and 398, and permission of instructor. Special consideration is given to students who have completed THETR 280 or intend to continue in the area of stage or screen directing. Recommended: THETR 250 and 281. D. Feldshuh. This course builds on the staging techniques learned in Fundamentals of Directing I. In this course each student directs a series of projects and public presentations focusing on specific directorial challenges.

THETR 499 Practicum in Directing Fall or spring. 1–4 credits. Prerequisites: THETR 240, 250, 280, 398, 496, and permission of instructor. D. Feldshuh. This course allows the student who has completed the appropriate prerequisites the opportunity to direct a full presentation of theatre in conjunction with a faculty mentor. It may also involve an internship with a prominent director on campus or the opportunity to assist direct a faculty or guest director.

Playwriting

THETR 348 Playwriting (IV) (LA) Fall. 4 credits. Limited to 12 students. Prerequisites: permission of instructor. Staff. Various approaches and techniques are examined as the student is introduced to the art and craft of dramatic writing. The student is required to read dramatic texts, observe theatre productions and rehearsals, and write. The semester culminates in the completion of a 20- to 30-minute one-act play.
THETR 349 Advanced Playwriting (IV) (LA)  
Spring. 4 credits. Prerequisite: THETR 348 or permission of instructor. Not offered 2004-2005. Staff.

A continuation of THETR 348, emphasizing advanced techniques and culminating in the completion of a full-length play.

THETR 497 Seminar in Playwriting  
1-4 credits. Prerequisite: THETR 348 and 349 and permission of instructor. Not offered 2004-2005. Staff.

This class is an extension of THETR 348 and 349. Students formulate a process for developing a full-length play, which they develop over the course of the semester. The class meetings are made up of discussions about the students’ process and creative tactics, and reading of material generated by the playwrights.

Design, Technology, and Stage Management

Design

THETR 250 Fundamentals of Theatre Design and Technology (IV) (LA)  
Fall and spring. 4 credits. Not open to first-term freshmen. Limited to 12 students. Registration only through department roster in 225 Schwartz Center. A minimum of one credit of Production Lab (THETR 151 or 251) is strongly recommended concurrently. Students are required to purchase materials, which the instructors will specify (approximate cost $50). K. Goetz, W. Cross, E. Intemann, S. Bernstein.

The course introduces the principles of designing scenery, costumes, lighting and sound, and the technical process of realizing designs on stage.

THETR 254 Theatrical Makeup Studio  
Spring. 3 credits. Prerequisite: permission of instructor. Limited to ten students. Students are required to purchase makeup kits that the instructor will provide (approximate 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 155) credit. Not offered 2004-2005. Basic technique of makeup design and application for the stage including corrective, old age, likeness, and animal use of some three-dimensional makeup and false facial hair.

THETR 319 Music, Dance, and Light (also DANCE 319, VISST 319) (IV) (LA)  
Fall. 3 credits. Attendance at dance and music concerts is required. E. Intemann and A. Fogelsanger.

Artistic values, parameters, and concerns of music (sound design), dance, and lighting design are compared and contrasted, and the combination of design elements is analyzed in contemporary dance. Includes writing in response to readings, audio and video recordings, and performances. Some classes devoted to creating sound, movement, and lighting.

THETR 343 Costume History: From Fig Leaf to Vanity *(IV) (LA)  
Fall. 3 credits. Limited to 20 students. S. Bernstein.

Costume History offers an overview of the history of clothing from the first signs of clothing to the early twentieth century. It investigates social, political, economic, technological, and cultural influences on costume.

THETR 362 Lighting Design Studio I (also VISST 362) (IV) (LA)  
Fall. 4 credits. Limited to 6 students. E. Intemann.

The course explores the aesthetic and mechanical aspects of light and their application in a variety of disciplines. Emphasis will be on understanding lighting’s function in an environment and manipulating light effectively. Artistic style and viewpoint are also covered.

THETR 364 Scenic Design Studio (IV) (LA)  
Fall. 3 credits. Limited to 10 students. Prerequisite: THETR 250 and 340 or permission of instructor. Students are required to purchase materials that the instructor will specify (approximate cost $50). K. Goetz.

The course explores the exploration of the process of designing scenery for the live theatre. Projects employ various media to explore the relationship of architecture, the scenic space, and elements of interior design. Experience in theatre production and graphic skills is helpful but not essential.

THETR 365 Automated Lighting and Control Systems (IV) (LA)  
Fall. 3 credits. Permission of instructor. Limited to 8 students. A minimum of 1 credit of either THETR 151 or 251 (Production Laboratory 1 or II) is strongly recommended. E. Intemann and F. Sellers.

This course covers the understanding and application of light control technologies, including electrical systems, color, optics, dimming protocols, and console programming. Students will complete a series of projects culminating in the programming and use of moving fixtures and lighting visualization software.

THETR 366 Costume Design Studio (IV) (LA)  
Spring. 3 credits. Students are required to purchase materials that the instructor will specify (approximate cost $70). Limited to 10 students. S. Bernstein.

Design of costumes for the theatre, concentrating on script and character analysis, period research, design elements, figure drawing and rendering skills, and an understanding of production style. May be repeated for credit.

THETR 368 Sound Design and Digital Audio (also MUSIC 355) (IV) (LA)  
Fall. 4 credits. Prerequisite: permission of instructor. Some experience with audio/video recording or editing is helpful, but not necessary.

THETR 369 Digital Performance (IV) (LA)  
Spring. 4 credits. Prerequisites: junior-level standing and above and permission of instructor. Possible lab performances on selected Fridays. We suggest that students have taken one of the following: FILM 377, FILM 391, MUSIC 120, MUSIC 320, THETR 250, or THETR 368. W. Cross.

The course is an introduction to the multimedia programming languages MAX, MSP and Jitter. There will be weekly projects requiring time in the studio, outside of class, and focusing on the input, manipulation, and output of sound and video in live performance and installation. Topics will include digital audio/video processing, midi control, sensor use and development, and electroacoustic music. Students must audition a five-to-ten-minute piece—either music, film, theatre, or movement—and clearly indicate how this performance would make use of the technology. These pieces would then become the content to be enhanced and performed.

THETR 371 Costume Design Studio II (IV) (LA)  
Fall. 3 credits. Prerequisite: THETR 360, or THETR 250 with permission of instructor. Students are required to purchase materials that the instructor will specify (approximate cost $50). Limited to 10 students. E. Intemann.

This course explores unconventional costume designs for theatre and dance. It 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. It also covers alternative (some non-Western) ways to create character through costume, make-up, masks, and wearable forms of puppetry.

THETR 462 Lighting Design Studio II (also VISST 462) (IV) (LA)  
Spring. 4 credits. Prerequisite: THETR 250 or THETR 362 or permission of instructor. Limited to 6 students. E. Intemann.

This course concentrates on designing lighting for different genres of performance in various venues. Emphasis will be placed on developing both the visual sophistication and the technical artistry of the lighting designer. Commitment, personal style, and professional presentation are stressed.

THETR 464 Scene Design Studio II (IV) (LA)  
Spring. 3 credits. Prerequisite: THETR 364 or permission of instructor. Students are required to purchase materials that the instructor will specify (approximate cost $50). K. Goetz.

Projects and activities are tailored to the creative and developmental needs of the individual student with emphasis on developing professional standards and practices that would prepare the student for a major design assignment in the department production season.
An exploration of the techniques and practice building of theatre operation, scenic construction, effects, attractions work: audio and lighting design, engineering, construction, and attraction entertainment projects including architecture, and development aspects of large-scale interactive entertainment attractions. Papers, and science in today's theme parks and drafting.

Exploration into the integration of art the convention and process of visualization a series of projects to familiarize students with the approach to drafting for the theatre. Involves implementation of the fundamentals of painting, and technical drawing. Introduction of the concept of an individual style in the drafting and technical drawing. Introduction to the communication skills and an understanding of the production process as experienced by a working stage manager or assistant stage manager. THETR 153, 253, and 353 complement this course.

THETR 252 Technical Production Studio I
Fall. 3 credits. Limited to 6 students.
D. Hall and F. Sellers.
Stage Lighting and Sound Technology: the practical aspects of lighting and sound technology including equipment setup, engineering, electrics, organization, recording techniques, and production paperwork are explored through projects, lectures, and class discussions. In addition to twice-weekly class meetings the course requires a laboratory commitment of 50 hours for the semester.

THETR 256 Technical Production Studio II
Spring. 3 credits. Limited to 6 students.
Students are required to purchase materials that the instructor will specify (approximate cost $15). Prerequisite: THETR 250 or permission of instructor. Additional hands-on time in prop and paint shops required, to be discussed. (C. Seakatz 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 340 Theatrical Drafting and Technical Drawing Studio
Fall. 3 credits. Limited to 6 students.
Prerequisite: THETR 250 or 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.

THETR 352 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 354 Stagecraft Studio
Fall. 3 credits. A minimum of 1 credit of production laboratory (THETR 151 or 251) is strongly recommended concurrently. Prerequisite: THETR 250 or permission of instructor. R. Archer.
An exploration of the techniques and practice of theatre operation, scenic construction, stage mechanics, rigging, painting, and model building.

THETR 356 Costume Construction Studio
Spring. 3 credits. A minimum of 1 credit of production laboratory (THETR 151 or 251) is strongly recommended concurrently. Lab fee of $100 to be paid in class. R. MacPike.
A project/lecture/discussion class in costume research, patterning, cutting, construction, and fitting.

THETR 360 Costumes: Special Projects
Fall. 3 credits. Permission of instructor. Lab fee of $100 to $150 to be paid in class. Course may be repeated for credit.
R. MacPike.
This course is designed for students who have completed a basic construction class (in THETR or TXA, or another department). Each fall, this project-oriented course will focus 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 153 Stage Management Production Lab I
Fall and spring. 1-2 credits. May be repeated for credit. Before registering, students must attend an orientation meeting at 7:30 p.m. in the Kiplinger Theatre at the Schwartz Center on the 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 S.L.T.C. under the supervision of the faculty production manager. THETR 370 complements this course.

THETR 253 Stage Management Laboratory II
Fall and spring. 1-4 credits. May be repeated for credit. Before registering, students must attend an orientation meeting at 7:30 p.m. in the Kiplinger Theatre at the Schwartz Center on the 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 370 complements this course.

THETR 353 Stage Management Laboratory III
Fall and spring. 1-4 credits. May be repeated for credit. Before registering, students must attend an orientation meeting at 7:30 p.m. in the Kiplinger Theatre at the Schwartz Center on the first Tuesday of classes. Prerequisite: permission of instructor. P. Lillard.
Practical experience in theatrical production as stage manager for a dance theatre concert or an ALTP production under the supervision of the faculty production manager. THETR 370 complements this course.

THETR 370 Stage Management Studio
Fall. 2 credits. Prerequisite: THETR 250 or 280 or permission of instructor. Students are required to purchase materials which the instructor will specify (approximate 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 153, 253, and 353 complement this course.

THETR 453 Stage Management Laboratory II
Fall and spring. 1-5 credits. May be repeated for credit. Prerequisite: admission to Advanced Undergraduate Theatre Program. P. Lillard.
Practical experience in theatrical production as stage manager for a season production under the supervision of the faculty production manager.

Production Laboratories
THETR 151 Production Laboratory I
Fall and spring. 1-3 credits. May be repeated for credit. Orientation meeting at 7:30 p.m. on the first Tuesday of classes each semester in the Kiplinger Theatre at the Schwartz Center. P. Lillard, S. Brookhouse, F. Sellers.
This course provides practical experiences in theatrical production. Students can work on scenery, costumes, properties, lighting, or stage crew. No prerequisites or experience required.

THETR 251 Production Laboratory II
Fall and spring. 1-3 credits. Prerequisite: permission of instructor. May be repeated for credit. Orientation meeting at 7:30 p.m. on the first Tuesday of classes each semester in the Kiplinger Theatre at the Schwartz Center. P. Lillard, S. Brookhouse, F. Sellers.
Practical experience in theatrical production, as a light board operator, sound board operator, sound technician, head dresser or scenery/props special project.

THETR 251 Production Laboratory III
Fall and spring. 1-3 credits. Prerequisite: permission of instructor. May be repeated for credit. Orientation meeting at 7:30 p.m. on the first Tuesday of classes each semester in the Kiplinger Theatre at the Schwartz Center. P. Lillard, S. Brookhouse, F. Sellers.
Practical experience in theatrical production as a master electrician, assistant technical director, assistant costume shop manager, or assistant to a faculty or guest director or designer.

THETR 451 Production Laboratory IV
Fall and spring. 1-4 credits. May be repeated for credit. Prerequisite: admission to Advanced Undergraduate Theatre Program. P. Lillard, R. Archer.
Practical experience in theatrical production, in the position of designer, shop manager, technical director, or sound engineer.

Independent Study, Internships, and Honors
THETR 300 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 225 Schwartz Center.
To be eligible to enroll and receive credit within this course, the internship must be preregistered 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 495 Honors Research Tutorial**
Fall or spring. 4 credits. Limited to Honors students in Theatre, Film and Dance. This course is the first of a two-semester sequence (the second is THETR 496) for seniors engaged in an honors project.

**THETR 496 Honors Research Tutorial**
Fall or spring. 4 credits. Limited to Honors students in Theatre, Film and Dance. This course is the second of a two-semester sequence (the first is THETR 495) for students engaged in an honors project.

**Film**
D. Barthrick, D. Fredericksen (director of undergraduate studies in film), S. Haenni, M. Rivchin, A. Villarejo

The study of film began in this department in the 1930s and continues to be based here. In the intervening years, however, it has also spread into a significant number of other departments in the college: African studies, anthropology, Asian studies, comparative literature, English, German studies, history, psychology, romance studies, and women's studies. This proliferation of courses has been accompanied by a comparable proliferation of perspectives and faculty concerns, e.g., the relationship of national cinemas to national literatures and specific cultures, film's relationships to myth and ideology, the use of film to provide 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. The foundational courses in film production and in the history, theory, and criticism of film as an art are centered in this department.

This richness of courses and perspectives is matched by the ways in which students may make film the focus of their undergraduate studies. The three ways currently being used are: 1) majoring in film within the Department of Theatre, Film & Dance; 2) constructing an individually tailored Independent Major in film (including the possibility of placing film in tandem with another major or discipline); and 3) focusing on film as a College Scholar. Students interested in options 2 or 3 should consult Don Fredericksen (Theatre, Film & Dance) and Ken Gabard (director of the College Scholar Program) or Lynne Abel (director of the Independent Major program). Students interested in the first option should consult Don Fredericksen (director of undergraduate studies in film). In addition, students should be aware that the college has recently approved a five-course concentration in visual studies, which can be taken independently of, or in conjunction with, a major in film. Students interested in the visual studies concentration should contact Susan Buck-Morss, its director.

**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 375 and 376)— 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 adviser. In particular, students must plan to be in residence at Cornell during both their junior and senior year fall semesters to take FILM 375 and 376. Within the "core" required courses, FILM 274 Introduction to Film Analysis, is to be taken during the sophomore year. Please note: Prospective majors must earn a grade of B- or higher in FILM 274 to be accepted into the major. Students may not enter the major until they have completed FILM 274 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 377, 383, 477, 478, 494. Enrollment in each of these courses is limited by the nature of the work and by facilities. Enrollment in FILM 477, 478, and 493 depends on the quality of previous work in FILM 377 and/or 383; enrollment is not guaranteed. Majors without a strong interest in production can complete the production requirement with one course: FILM 377, after they have taken FILM 274 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 274 Introduction to Film Analysis (offered every fall semester)
   - FILM 375 History and Theory of Commercial Narrative Film (offered alternate fall semesters; next offered fall 2004 (prerequisite for film majors: FILM 274))
   - [FILM 376 History and Theory of Documentary and Experimental Film (offered alternate fall semesters; offered fall 2005) (prerequisite for film majors: FILM 274)]
   - FILM 377 Introduction to 16mm and Digital Filmmaking (offered fall 2004 and 2005, and spring 2006)

2) One of the following theatre courses:
   - THETR 250 Fundamentals of Theatre Design/Technology (offered every semester)
   - THETR 280 Introduction to Acting (offered every semester)
   - THETR 398 Directing I (prerequisite: permission) (offered every fall semester)

3) Four courses (15-16 credits) in film offered by Theatre, Film & Dance as below, or (with consent of advisor) by other departments:
   - FILM 341 French Film (offered occasionally; offered fall 2004)

**FILM 342** The Cinema and the American City (offered spring 2005)
**FILM 344** American Film Melodrama (offered spring 2005)
**FILM 369** Fast-Talking Dames and Sad Ladies: 1940s and Now (offered yearly; offered fall 2004)
**[FILM 378] Soviet Film of 20s and French Film of 60s (offered occasionally; not offered 2004-2005)]
**[FILM 379] Modern Documentary Film (offered alternate spring semesters; offered spring 2006)]
**FILM 383** Screenwriting (offered fall 2004)
**FILM 386** Cinema and Social Change (offered occasionally; next offered spring 2005)
**FILM 391** Media Arts Studio I (offered fall 2004)
**[FILM 395 Video: Art, Theory, Politics (offered occasionally; not offered 2004-2005)]
**[FILM 396] German Film (offered occasionally; not offered 2004-2005)]
**FILM 422** Cinematography (offered spring 2005)
**[AS&RC 435 African Cinema (offered alternate years; not offered 2004-2005)]
**[FILM 450 Rescreening the Holocaust (offered occasionally; not offered 2004-2005)]
**FILM 455** History of Modern Polish Cinema (offered alternate spring semesters; offered spring 2005)
**[FILM 473 Film and Spiritual Questions (offered alternate spring semesters; offered spring 2006)]
**FILM 474** Jurg. Film, and the Process of Self-Knowledge (offered alternate years; offered fall 2004)
**FILM 475 Seminar in the Cinema I (offered most years; offered spring 2005; topic varies; may be repeated for credit; topic for spring 2005: Poetic Structures)
**[FILM 476 Seminar in the Cinema II (offered occasionally; not offered 2004-2005; topic varies; may be repeated for credit)]
**[FILM 477 Intermediate Film and Video Projects: Documentary and Experimental Workshop (offered alternate years; offered fall 2005)]
**FILM 478 Intermediate Film and Video Projects: Narrative Workshop (offered alternate years; not offered 2004-2005; next offered fall 2005)]
**FILM 479** 1939 (offered fall 2004)
**FILM 493 Advanced Film and Video Projects (offered spring 2005)

4) 15 credits of related course work inside or outside the Department of Theatre, Film & Dance (as approved by the major adviser). The courses chosen to fulfill this requirement should reinforce a major's
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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 esthetics or social history, will be encouraged to choose related course work in those areas.

5) Students must earn at least a B- in FILM 274 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.

Honors

Students who have maintained a GPA of 3.5 in their film major courses, and an average of 3.0 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).

The Advanced Undergraduate Filmmaking Program

The department offers advanced study in filmmaking to students who qualify on the basis of outstanding achievement in film studies and film production courses. Acceptance to the AAPF and admission to the advanced film production course (FILM 493) will be determined by a committee of film faculty in December of each year, based on applications from students who have a proposal (script or treatment) for a film or video project. Up to four such students will also be selected to receive the McVille Shavelson Award to help fund their advanced film projects.

Film Study Abroad

The College of Arts and Sciences, through this department, offers courses in film and animation at a number of other American colleges and universities - offers up to a full year of study at the Paris Center for Critical Studies. 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 an intensive supplement to Cornell's film courses. Fluency in French is required. FILM 274 and 275 are prerequisites. Inquiries should be addressed to Professor Fredericksen. Cornell's liaison with the center.

FILM 265 Studies in Film Analysis: Monsters and Misfits: Hollywood's Misogynist Myths of Women (also ENGL 263 and FLSGS 263) (IV) (LA)

Spring. 4 credits. Permission of the instructor required. Students enrolling in this seminar must be free to view films late afternoons on Mondays and Tuesdays. Lab fee $25. D. Bogel.

Exploring a series of (mostly) Hollywood films, we will consider the cultural, political, sexual, and psychological implications of conservative myths that demonize women in film. Mainstream misfits and monstrous mothers, love-lore ladies and sermonizing suffragettes, language-lacking loners and marriage-mangling marauders, vampires and aliens: all film genres make room to exclude misfits, co-opt them back into the circle, or define community norms in opposition to them. We will view, discuss, and read about such films as The Piano Teacher, The Hand that Rocks the Cradle, Psycho, The Manchurian Candidate (two versions), Safe, The Piano, Far from Heaven, The Searchers, Alien, Gilda, Fatal Attraction, The Stepford Wives (two versions), The Haunting, Carrie, Boys Don't Cry, and The Bitter Tears of Petra von Kant.

FILM 274 Introduction to Film Analysis: Meaning and Value (also FILM 674) (IV) (LA)

Fall. 4 credits. Limited to 40 students. Graduate students must enroll in FILM 674. D. Fredericksen.

An intensive consideration of the ways films generate meaning and of the ways we attribute meaning and value to films. Discussion ranges over commercial narrative, documentary, and personal film modes. Prospective film majors should enroll in their sophomore year.

FILM 276 Survey of American Film (also AM ST 230) (IV) (LA)

Fall. 4 credits. Limited to 40 students. Discussion sections once a week. Offered alternate years; next offered 2005-2006. S. Haenni.

Focusing mostly on Hollywood film, this course surveys community developments in and approaches to twentieth-century American cinema. We trace changes in film aesthetics and film style, the development of the American cinema as an institution that comprises a number 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, style, and authorship—and focuses on the ways film shapes gender, race, class, ethnic, and national identities. Screenings include work by D. W. Griffith, John Ford, Howard Hawks, Orson Welles, Vincente Minnelli, Robert Altman, Charles Burnett, Spike Lee, and others. Some course work in readings in film criticism and history.

FILM 324 Film Animation Workshop: Experimental and Traditional Animation on the Oxberry

Summer. 3 credits. Equipment expense $200. L. Tomlinson.

The art of animation involves many dimensions, including time and motion. This course introduces students to the fundamentals of traditional animation and the mechanics used to capture the illusion of movement. By modeling our projects on the mechanics used to capture the illusion of movement, we can create animation. By designing our projects on the mechanics used to create animation, we can create art. By designing our projects on the mechanics used to create art, we can create animation. By designing our projects on the mechanics used to create animation, we can create art.

FILM 341 French Film (also FRLIT 336) (IV)

Fall. 4 credits. Offered occasionally; offered fall 2004. T. Murray.

For description, see FRLIT 336.

FILM 342 The Cinema and the American City (also AM ST 309) (IV)

Spring. 4 credits. Offered spring 2005. S. Haenni.

For description, see AM ST 309.

FILM 344 American Film Melodrama (also AM ST 338, ENGL 344, and VISST 348)

Spring. 4 credits. Some background in film analysis useful but not required. S. Haenni.

Melodrama has often been dismissed as overwrought with emotion, moralizing, and sensationalism. Film studies, however, has reconceptualized melodrama as an intriguing "mode of excess" that powerfully and profoundly affects film audiences. We will examine how and to what purposes melodrama has been used in the 20th century. We will look at different aspects of melodrama—its inheritance from nineteenth-century stage melodrama, its pictorialism, acting style, music, and its uses of paranoia, entrapment, and fast-paced action. We will consider the form and function of melodrama in different periods—1950s America, the early twentieth century, the Jazz Age, the economic depression of the 1930s, World War II, and the contemporary moment. Among the questions we will ask some questions. How does melodrama position and affect its spectators? How does it allow space for the representation of marginalized voices (of women and African Americans, for example)? How does it affect the way we understand the nation? How does it address questions of social justice? How has melodrama been viewed and appropriated by oppositional audiences and fan cultures? What are the implications of film style for melodrama, and why is music so important to the genre? Screenings will include films by Griffith, Vidor, Cukor, Hitchcock, Ophuls, Sirk, Ray, and Spielberg, and will be guided by readings in film history and film theory.

FILM 346 Film Noir (also AM ST 340) (IV) (VI) (LA)


At the close of World War II, the French coined the term "film noir" to describe a new, "dark," and "gloomy" set of Hollywood films that were populated by femmes fatales, criminal gangsters, private eyes, and lovers on the run, and which centered on issues of violence, crime, paranoia, the noir, and self-doubt. Derived from hard-boiled detective fiction and influenced by German expressionist cinema, film noir has become one of the best-loved genres of Hollywood film. In this course, we explore both the stylistic characteristics and thematic and cultural contexts of film noir. We examine the history and function of "noir" as a critical term; the influence of hard-boiled fiction; and the evolution of noir style and noir narratives. We investigate how film noir articulates anxieties about postwar masculinity and the sexual and social roles of women; how it popularizes psychology; how it portrays the city as an "urban jungle"; and how it represents a response to fears about communism and the atomic bomb. Screenings
include major studio features such as *Double Indemnity* and *Laura*. B-pictures such as *Detour* and *Gun Crazy*, and "neo-noirs" such as *Chinatown* and *Devil in a Blue Dress*. Our discussion of films is guided by readings in film criticism and history.

**FILM 369 Fast-Talking Dames and Sad Ladies: 1940s and Now (also ENGL 369) (IV) (LA)**

Fall. 4 credits. I. Bogel. For description, see ENGL 369.

**FILM 375 History and Theory of the Commercial Narrative Film (also VISST 375) (IV) (LA)**

Fall. 4 credits. Fee for screening expenses $10 (paid in class). Prerequisite for film majors FILM 274. Offered alternate years; offered fall 2004 and fall 2006. S. Haenni. Consideration of the broad patterns of narration in the history of the commercial narrative film. Emphases are placed on the early articulation of a cinematic means of narration, realism as an artistic style, the nature and functions of popular film, and the modes of modernist and post-modERNist "art cinema" narration.

**FILM 376 History and Theory of Documentary and Experimental Film (also VISST 376) (IV) (LA)**

Fall. 4 credits. Fee for screening expenses $10 (paid in class). Prerequisite: FILM 274 is strongly recommended but not required. Fee for screening expenses $10 (paid in class); those of you who have ever spring semesters; offered spring 2006. D. Fredericksen. This course analyzes canonical works in documentary film up to the end of World War II. Including Flaherty, Greenson, Hurwitz, Grierson, Wright, Capra, Riefenstahl, and the connection between documentary film and modernism(s) in the 1920s and 1930s. It also includes analysis of canonical works in the avant-garde/experimental/personal film tradition(s) in Europe and the United States from the 1920s to the 1980s, including French impressionism, surrealism, the New Realism, graphic cinema, and the several patterns of the American personal film during its heyday (1940s to the late 1970s).

**FILM 377 Introduction to 16mm and Digital Video (IV) (LA)**

Fall and spring. 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 274 (for higher-level film studies course) and permission of instructor. Equipment fee $125 (paid in class). The average cost to each student for materials and processing is $400. Offered fall 2004 and spring 2005. M. Rivchin. This is a 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 nonlinear digital editing. Students complete several exercises and two short projects; the final project may be narrative, documentary, experimental, or animation and will be shown in a public screening at the end of the semester on campus.

**FILM 378 Soviet Film of the 1920s and French Film of the 1960s (IV) (LA)**

Spring. 4 credits. Fee for screening expenses $10 (paid in class). Prerequisite: FILM 575 is strongly recommended but not required. Offered occasionally; not offered 2004–2005. D. Fredericksen. An intensive treatment of two distinct periods of radical innovation in film theory and history. Emphasis is on the animated relationship between theory and filmmaking during these two decades. Major figures include Eisenstein, Pudovkin, Vertov, Kuleshov, Dovzhenko, and Room in the Soviet 1920s; Godard, Truffaut, Resnais, Rohmer, Tati, Rouche, Bresson, and Bazin in the French 1960s.

**FILM 379 Modern Documentary Film (IV) (LA)**

Spring. 4 credits. Prerequisite: FILM 376 is strongly recommended but not required. Fee for screening expenses $10 (paid in class) for those of you who have ever spring semesters; offered spring 2006. D. Fredericksen. An intensive consideration of canonical documentary films from 1945 to the present. Emphases are on the documentary film as an artistic form with a distinct history and set of theoretical questions, as a sociopolitical force, as an ethnographic medium within and without a filmmaker's culture, and as a televised medium of persuasion and expression. Adjunct instructors include Hurwitz, Flaherty, Haasnoot, Franju, Renois, Wright, Jennings, Rouquier, Sucksdorff, Anderson, Rouch, Mallo, Wiseman, Watkins, Guzman, Trinh, T. Minh-ha, Van der Keuken, Gardner, Lanzmann, Pivowski, Borzotta, Forgacs, and the National Film Board of Canada.

**FILM 383 Screenwriting: Learning the Craft and Bringing Your Vision to Life (IV) (LA)**

Fall. 3 credits. Prerequisite: FILM 274 and 377 and permission of instructor. Limited to 12 students. Go to 225 CT to apply to the class. J. Hirschberg. For those of you who have ever sat in a movie theater and said, "I can do better." now is your chance. This course explores the fundamentals of traditional Hollywood and independent screenplays—concept, theme, structure, screen and characters—and the basics of marketing your finished script. Students will be required to create a pitch of their original idea, treatment, and a first draft of their full-length screenplay or short film script(s). The instructor and your fellow students critique all work in class. Typical readings are: Segretti, *Creating Unforgettable Characters*; Goldman, *Adventures in the Screen Trade*; and selected screenplays. This course requires a great deal of writing and rewriting—only those who are passionate about their craft need apply.

**FILM 386 Cinema and Social Change (was Third Cinema) (IV) (LA)**

Spring. 4 credits. A. Villarejo. This course explores the role of cinema (film, video, and digital media) in social and political change, both in terms of how political and historical contexts shape films. We will screen major works from Latin America, the U.S., Africa, South Asia, and the Middle East that address processes of decolonization as well as issues of labor, health-care, gender and racial equity, globalization, war, and imperialism. Readings are drawn from film criticism and theory, political, philosophical theory, and critical theory.

**FILM 390 African American Cinema (also AM ST 386, ART H 390, and AS&RC 390) (IV) (LA)**

Fall. 4 credits. Faculty. This seminar looks at the history of African American filmmaking from the perspective of directors, actors, studios, and audiences. We will study the works of pioneering black filmmakers from Ossianek to Julie Dash. Other topics include Race Cinema, Haploplation films of the 1970s, the New Black Cinema, Black women's filmmaking, and documentary. Readings in film studies and critical race theory direct our analyzes of the films. There will be weekly screenings in addition to regular seminar meetings.

**FILM 391 Media Arts Studio I (also ART 391, MUSIC 391, VISST 391) (IV) (LA)**

Fall. 3 credits. Prerequisite: permission of instructor and junior-level standing required, minimum FILM 377 or 277, or advanced studio courses. Equipment fee $50 (paid in class). Participating faculty include M. Rivchin, FILM; M. Lyons, ART; D. Borden, MUSIC.

A collaborative interdisciplinary studio course in a variety of digital and electronic media, including art, architecture, music, dance, film, and video. Group projects to investigate and produce interactive work in public spaces on campus.

**FILM 392 International Film of the 1970s (also AM ST 393) (IV) (LA)**

Fall. 4 credits. Some background in film analysis useful but not required. Offered occasionally; not offered 2004–2005. S. Haenni. More than being characterized by a retreat from political, critical cinema and by the re-emergence of the Hollywood blockbuster such as *The Godfather*, *Star Wars*, and *Jaws*, the seventies was also a period of enormous 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 itself. In this course, we focus on the transnational nature of seventies film: the influence of European art cinema on American film; the reworking and rejuvenation of genre films (neo-noir, western, horror film, road movie); European responses to and appropriation of American film genres, film conventions, and subject matter; Asian influences in the United States, particularly the martial arts film; and the emergence of film subcultures, such as black independent film and exploitation. Screenings include work by Arthur Penn, Robert Altman, Francis Ford Coppola, Steven Spielberg, Charles Burnett, John Cassavetes, Mario Van Peebles, Gordon Parks, Milos Forman, Sergio Leone, Michelangelo Antonioni, Lina Wertmuller, Bertrand Blier, Louis Malle, Eric Rohmer, Chantal Akerman, Rainer Werner Fassbinder, Wim Wenders, Nicholas Roeg, and Stanley Kubrick are guided by readings in film criticism and film history.

**FILM 395 Video: Art, Theory, Politics (also ENGL 395) (IV)**

Fall. 4 credits. Offered occasionally; not offered 2004–2005. T. Murray. For description, see ENGL 395.
FILM 396 German Film (also COM L 396 and GERST 396) (IV) (LA)
Fall. 4 credits. Requirements: participation in class discussion, one paper, midterm, and final exams. Offered 2004-2005. D. Bathrick. This course explores German film from the Weimar and Nazi periods to the present in relation to the cultural and sociopolitical context of each part. Readings and lectures are devoted to formal and cultural developments historically as well as interpretive analysis of selected individual films.

FILM 422 Cinematography
Spring. 4 credits. Limited to 8 students. Prerequisite or corequisite with FILM 493. Permission of the instructor required. Letter grade only. Class fee $125. Advanced camera and lighting techniques, designed for students who have taken at least FILM 377 and/or advanced photography courses. M. Rivchin. Students will work on a series of tests, short exercises, and scene projects using sync and non-sync 16mm cameras, 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 450 Rescreening the Holocaust (also COM L 453, GERST 449, RELST 450, JWST 449) (IV) (LA)]
Fall. 4 credits. Offered alternate years. Not offered 2004-2005. D. Bathrick. Rescreening the Holocaust offers a survey of the major films dealing with the Holocaust beginning with Night and Fog (1955) and including such films as Holocaust, Schneider's List, Shoah, The Diary of Anne Frank, Kapo, My Mothers Courage, and others. The course focuses on major issues of debate around the possibilities and limits of representing the Holocaust cinematically as well as questions more specifically concerning commercialization, fictionalization, trivialization, documentation, visualization, and narrativization in the making and distributing of films about this event. What are the concerns that have arisen over the years concerning the dangers of aestheticizing the Holocaust in works of literature and the visual arts? Is it possible to employ a comedic narrative to deal with such a topic, and, if so, what are the benefits or potential problems of such an approach? Is the very treatment of such a topic within the framework of the Hollywood entertainment industry itself a violation of respect for those who perished? The title of the course suggests a methodological approach that emphasizes the notion that screenings of the Holocaust are at the same time often re-screenings, to the extent that they presuppose, or even explicitly cite or take issue with earlier cinematic renderings.

FILM 455 History of Modern Polish Film (IV) (LA)
Spring. 4 credits. Prerequisite: some previous film analysis course work. Offered alternate years; offered spring 2005. D. Fredericksen. Analysis of Polish film from 1945 to the present, within the context of Poland's postwar history. Topics include the period of socialist realism, the so-called "Polish School" (1956-1962), the cinema of moral anxiety, Solidarity cinema, and the Polish documentary tradition. Key directors to be considered include Ford, Wajda, Munk, Polanski, Skolimowski, Zanussi, Folk, Ptaszynski, Bugajski, Krzystek, Knowski, Kieslowski, and others. Special attention is given to the development of Polish film theory. The extra-filmic context is set by such works as Norman Davies' Heart of Europe, Czeslaw Milosz' The Captive Mind, and Eva Hoffman's Exit into History.

[FILM 473 Film and Spiritual Questions (also RELST 473) (IV) (LA)]
Spring. 4 credits. Limited to 20 students. Offered alternate spring semesters. Offered spring 2006. D. Fredericksen. The use of film as a medium for the expression of spiritual questions has a long and rich history, although little attention is given to this fact in contemporary film studies. This seminar examines films and writings by filmmakers who are so inclined, including Bailie, Gardner, Bergman, Dreyer, Breton, Godard, Scorsese, Brakhage, Blunden, Whitney, Rouquier, Newby, Kubrick, and Bae Yong-Kyun. Special attention is given to the work of Andrzej Tarkovsky, the Russian film director and theorist. Readings include Tarkovsky's Sculpting in Time, Smith's Why Religion Matters, Eliade's The Sacred and the Profane, Edinger's The Christian Archetype, Schrader's Transcendental Style in Film, and Warren and Loew's The Sacred and the Sacred in Film.

FILM 474 Jung, Film, and the Process of Self-Knowledge (IV) (LA)
Fall. 4 credits. Limited to 20 students. Offered alternate years; offered fall 2004. D. Fredericksen. "Know thyself" is one of the oldest and most enduring imperatives of the human spirit, and the rationally for liberal studies. This seminar traces in some detail the Jungian approach to this imperative and then tests its critical capacities with respect to films by Fellini (8 1/2), Bergman (Persona), and Roey (Walker). Readings include Jung's Memories, Dreams, Reflections, Two Essays in Analytical Psychology, Archetypes and the Collective Unconscious, and Murray Stein's In Midlife.

FILM 475 Seminar in Cinema I (also VISST 475) (IV) (LA)
Fall or spring. 4 credits. Limited to 20 students. Offered most years; offered spring 2005. FILM 274, 375, or 376 recommended. D. Fredericksen. Topic for spring 2005: Poetic structures. Close analyses of films that are structured in ways that fall outside classical narrative, including films by Robert Gardiner, Basil Wright, Leni Riefenstahl, Germaine Dulac, Maya Deren, Stan Brakhage, Bruce Baillie, Larry Jordan, Leighton Buzzard, Luis Bunuel, Andrei Tarkovsky, and others. May be of particular interest to filmmakers who wish to find models for operating outside "normal" storytelling structures and to analysts interested in the workings of film metaphor, parallel structures, associative logics, and "vertical" structure.

[FILM 476 Seminar in the Cinema II (IV) (LA)]
Fall or spring. 4 credits. Offered occasionally; Not offered 2004-2005.

[FILM 477 Intermediate Film and Video Projects: Documentary and Experimental Workshop (IV) (LA)]
Fall. 4 credits. Limited to 8 students. Prerequisites: FILM 377 as minimum production; preference given to those who have taken FILM 376 (History and Theory of Documentary and Experimental Film), 379 (Modern Documentary Film), or 386 (Cinema and Social Change); and permission of instructor based on project proposals. Equipment fee $100 (paid in class). Film projects costs $500-1,000; video $100-200. Next offered fall 2005. M. Rivchin. An intensive course in 16mm filmmaking and digital video in which each student develops a significant documentary or experimental project both critically and creatively. Readings, discussions, and exercises are designed to increase the student's knowledge and practice of cinematography, lighting, sync-sound filming, and editing techniques; working with labs and sound houses; digital video camera; and both analog and nonlinear (AVID) digital editing.

FILM 478 Intermediate Film and Video Projects: Narrative Workshop (also VISST 478) (IV) (LA)
Fall. 4 credits. Limited to 8 students. Prerequisites: FILM 377 as minimum production; preference given to those who have taken FILM 375 (Mothers), 379 (Modern Documentary Film), 386 (Cinema and Social Change), or 413, and permission of instructor based on proposals. Equipment fee $125 (paid in class). Film projects costs $500-1,500; video $100-200. Not offered 2004-2005. M. Rivchin. An 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 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 nonlinear (AVID) and final Cut Pro editing.

FILM 479 1939 (also VISST 479) (IV) (LA)
Fall. 4 credits. Prerequisite: FILM 274 or a course in film analysis. Screening fee $10 (paid in class). A. Villarejo. 1939 is one of the most astonishing and famous years in American cinema: Stagecoach, Gone with the Wind, The Wizard of Oz, Dark Victory, Niteclub . . . the list goes on. Television was introduced to the U.S. public at the World's Fair of 1933 in New York. To understand the film industry at its peak, and to understand the context of 1939 in political and social terms, this course broadens the horizon to examine the cinema of 1939 worldwide. We will look at the work of emigre artists who fled Europe, as well as the cinemas of Nazi Germany and fascist Italy, alongside films from France and other parts of Europe, India, Japan, and Mexico. We will screen narrative films alongside documentaries and experimental films (the March of Time meets Porky Pig); we'll look at early television programming and listen to radio broadcasts. Contemporary works of fiction and journalism as well as the visual culture of 1939 will supplement readings in film history and theory.
FILM 485 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 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 the semester, the internship must be unpaid. Students must follow the rules and procedures stated on the departmental internship form.

FILM 493 Advanced Film and Video Projects (also VSS 493) (IV) (LA)
Spring. 4 credits. Limited to 6-8 students. Prerequisite: minimum FILM 377, preference to those who have taken 477 or 478; recommended: FILM 383 (Screenwriting) and THETR 398 (Directing I). Equipment fee $125. Project costs $500-2000. M. Rivchin.
This is an 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 will direct and edit their own (or collaborative) projects, working in camera 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, nonlinear (Final Cut Pro and AVID) editing.

FILM 610 Sexuality and the Politics of Representation (also FGSS 610)
Spring. 4 credits. One weekly screening required. Prerequisite: an advanced course in film or critical theory. Primarily intended for seniors and graduate students.
A. Villarejo.
The seminar will explore contexts for critical work on sexuality and film/video. Beginning with the texts of Foucault, Freud, Lacan, Derrida, Rose, and Jeffrey Weeks, the course examines the uses and abuses of psychoanalytic theory, as well as the regulation of sexuality in the past century.

FILM 674 Introduction to Film Analysis: Meaning and Value
Fall. 4 credits. Limited to 10 graduate students. D. Fredericksen.
An intensive consideration of the ways films generate meaning and of the ways we attribute meaning and value to films. Discussion ranges over commercial narrative, documentary, and personal film modes. Graduate students who intend to teach film at the undergraduate level are especially welcome. In addition to full participation in the work of FILM 274, graduate students will read and discuss in tutorials primary sources in film theory.

FILM 722 Independent Study in Film for Graduate Students
Fall or spring. Staff.

Dance
Faculty: J. Chu, A. Fogelhanger (director of undergraduate studies in dance), J. Kovar, J. Morgenroth, J. Self, B. Suber.
The dance program offers courses in dance technique, improvisation, composition, performance, and theoretical 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 Javanese dance, 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 eight academic credits (one each semester) in technique courses. Students may also satisfy the physical education requirement by taking dance technique courses in the dance program. Students taking technique for academic credit must also register through the Physical Education program, supplementing 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 eight academic credits (one each semester) in technique courses. Students may also satisfy the physical education requirement by taking dance technique 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 works, performed in public concert. Admission to rehearsal and performance courses is by permission. The music-resources courses DANCE 201 (Dance Improvisation), DANCE 324 (Music for Choreography), the optional THETR 250 (Fundamentals of Dance Design and Technology), and the optional music course before the junior year. The following requirements are expected of the major.

Dance Major Requirements
To be admitted to the major, students must have completed two technique courses in modern dance or Western classical at level II or above, and DANCE 210 (Beginning Dance Composition). It is recommended that students take DANCE 201 (Dance Improvisation), DANCE 324 (Music for Choreography), the optional THETR 250 (Fundamentals of Theatre Design and Technology), and the optional music course before the junior year. The following requirements are expected of the major.

Prerequisites for the Major:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>DANCE 210 Beginning Dance Composition</td>
<td>3</td>
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<tr>
<td>Two technique courses in modern dance or Western classical at level II or above</td>
<td>0-2</td>
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<tr>
<td>TOTAL</td>
<td>3-5</td>
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Requirements for the Major:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two semesters each of Western classical and modern dance (in addition to the prerequisite)</td>
<td>0-4</td>
</tr>
<tr>
<td>One academic or studio course in non-Western form</td>
<td>0-4</td>
</tr>
<tr>
<td>DANCE 155 Rehearsal and Performance</td>
<td>1</td>
</tr>
<tr>
<td>DANCE 201 Dance Improvisation (offered every spring semester)</td>
<td>1</td>
</tr>
<tr>
<td>DANCE 212 Music Resources I, and</td>
<td></td>
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<tr>
<td>DANCE 323 Music Resources II, or DANCE 324 Music for Choreography (offered every spring semester)</td>
<td>3</td>
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<tr>
<td>DANCE 233 Explorations in Movement and Performance (offered every fall semester)</td>
<td>1</td>
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</tbody>
</table>

Two courses from the following approved list of five choices selected in consultation with the student's advisor:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>One of MUSIC 103 Intro to World Music I: Africa and the Americas, MUSIC 104 Intro to World Music II: Asia, MUSIC 105 Introduction to Music Theory (or substitute at the appropriate level), MUSIC 107 Hildegard to Handel, MUSIC 108 Mozart to Minimalism</td>
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<tr>
<td>THETR 250 Fundamentals of Design and Technology</td>
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<td>DANCE 258 Techno Soma Kinesics (offered every spring semester)</td>
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<td>DANCE 319 Music, Dance &amp; Light (offered alternate fall semesters)</td>
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<tr>
<td>[DANCE 413 Film and Performance (offered occasionally)]</td>
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<tr>
<td>DANCE 310-311 Intermediate Dance Composition</td>
<td>6</td>
</tr>
<tr>
<td>DANCE 312 The Moving Body (offered every fourth or fifth semester)</td>
<td>3</td>
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<tr>
<td>DANCE 314-315 Western Dance History (offered alternate years)</td>
<td>8</td>
</tr>
<tr>
<td>DANCE 418 Seminar in Dance Studies or other 400-level academic dance course (offered alternate years)</td>
<td>4</td>
</tr>
<tr>
<td>DANCE 491 Senior Project (yearlong course offered every year)</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>39-49</td>
</tr>
</tbody>
</table>

Students will be expected to perform in at least two concerts and to present at least two of their own dances, in addition to the senior project.

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 adviser in the spring of their junior year about the honors program in dance.

Dance Technique
Students may register for Western dance technique courses (DANCE 222, 231, 232, 303, 304, 306, 308, and 309) for 0 or 1 academic credit, with a limit of 1 credit per semester and 8 credits total. That is, in a single semester students may take at most one dance technique course for 1 credit; all additional dance technique courses must be taken for 0
DANCE 155 Rehearsal and Performance
Fall and/or spring. 1 credit. Students must register for the course in the term in which the credit is earned; requests for retroactive credit will not be honored. Limited to students who are cast in faculty-choreographed dances. Students may add this course only after they have been assigned roles. S-U grades only.

Course includes the study, development, and performance of roles in departmental dance productions.

DANCE 201 Dance Improvisation
Spring. 1 credit. S-U grade only. Limited to 12 students. Attendance at dance concerts is required. J. Self. 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 231 Dance Technique II/Classical (also PE 161)
Spring and spring. 0 to 1 credit. May be repeated. S-U grade only. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. 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 232 Dance Technique II/Modern (also PE 161)
Fall and spring. 0 to 1 credit. May be repeated. S-U grade only. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Fall, B. Suber; spring, J. Kovar. Introductory modern technique intended for students with some dance training. Material covered includes specific physical and spatial work with attention to rhythm, design, and movement expression.

DANCE 233 Explorations in Movement and Performance (also PE 162, VISST 233)
Fall. 0 or 1 credit. S-U grade only. Limited to 16 students. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. J. Self. A physically demanding exploration into various movement realms. Specific subjects covered are gender-specific movement, erotic power, spatial and performance. Techniques include extensive use of breath, animal movement, improvisation, and group games. This course requires an eagerness to investigate the nature of movement and explore unfamiliar territory in movement.

DANCE 234 Masculine, Feminine, or Neutral: Explorations in Movement and Performance II
Spring. 0 or 1 credit. S-U grade only. Limited to 16 students. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. J. Self. This course continues themes from Explorations in Movement and Performance (DANCE 233), with special emphasis on the differences and similarities between “masculine” or “feminine” expressions in movement and performance. Are there inherent movement patterns expressed by men only or women only? Can one learn opposite gender movement, or merely visit it? Is there such a thing as neutral movement? Students use props, costumes, and other performance tools to explore gender, movement, and performance. This course is physically demanding and requires a willingness to explore challenging themes.

DANCE 235 Hip-Hop, Hollywood, and Home Movies: Movement and Media
Fall. 0 or 1 credit. S-U grade only. Limited to 16 students. Attendance at dance concerts is required. J. Self. Using readily available media images from music television, Hollywood movies, and archival footage, this course will explore contemporary and popular dance forms. This course may be considered a laboratory for generating and understanding the constantly changing nature of contemporary dance forms. Questions to be considered include: How do the media influence and shape our movement patterns and sense of freedom within our body? How have different forms influenced each other? How does the easy accessibility of self-produced moving images inform our sense of self? Each class includes a warmup, viewing, analysis, and the trying or trying out of dances. Making a dance video and field trips to dance clubs and other events will be included.
DANCE 308 Advanced and pre-professional Modern Technique. A continuation of and supplement to DANCE 306.

DANCE 309 Advanced and pre-professional Western Technique. A continuation of DANCE 307/ASIAN 307. Emphasis is on choreography as well as composition process, and with readings, the important modern dance choreographer. Students may receive 3 credits for attending dance concerts is required. Fall, J. Chu and J. Self; spring, J. Morgenroth.

DANCE 311 Intermediate Dance Composition II (IV) (LA) Fall and spring. 3 credits. Prerequisite: DANCE 310. Corequisite or prerequisite: DANCE 324. Attendance at dance concerts is required. Fall, J. Chu and J. Self; spring, J. Morgenroth. A continuation of DANCE 310.

DANCE 323 Music Resources II Spring. 2 credits. Prerequisite: DANCE 212. Attendance at dance concerts and music concerts is required. DANCE 212 and DANCE 323 together count as a course for purposes of graduation and for satisfying the humanities or Literature and Arts distribution requirement. DANCE 323 will no longer be offered after spring 2006. A. Fogelsanger.

DANCE 324 Music and Choreography (IV) (LA) Spring. 3 credits. Attendance at dance concerts and music concerts is required. A. Fogelsanger.

DANCE 410 Advanced Dance Composition II (IV) (LA) Fall and spring. 3 credits. Prerequisite: DANCE 410. Attendance at dance concerts is required. Fall, J. Chu and J. Self; spring, J. Morgenroth.

DANCE 491 Senior Project in Dance Fall and spring. 6 credits over two semesters. Prerequisite: DANCE 311. This course is limited to senior dance majors only.

History, Criticism, and Theory

DANCE 204 Sophomore Seminar: Seminar in Dance Studies (also DANCE 418 and VISST 419) (IV) (CA) Fall. 4 credits. Limited to 15 students. J. Morgenroth.


DANCE 418 and VISST 419) (IV) (CA) Fall. 4 credits. Limited to 15 students. J. Morgenroth.

DANCE 491 Senior Project in Dance Fall and spring. 6 credits over two semesters. Prerequisite: DANCE 311. This course is limited to senior dance majors only.

Students who take this course: create a project in choreography and performance, dance, film or video, dance pedagogy, or other appropriate area agreed on with their senior project adviser 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.
Spring. 4 credits. Attendance at dance concerts is required.

This workshop is designed for pedestrians interested in understanding what exactly a "dance theory" can look like, sound like, and most importantly feel like. We will approach the everydayness of walking as a philosophical basis for that which we call neighbor. From this springboard, participants will investigate the accumulation of space, creation of location by bodily "consumption" of urban planning—a neighborhood, planned suburb, or gated community—through walking, "Social Life of Steps." Within the patterns of footsteps, we can quickly discern staging, songwriting even spelling (both literal and magical). We will investigate, through analytical choreography, the differences between a citizen, a resident, a consumer, a user, a neighbor, a demographic, and a neighborhood. This course is offered with the hope that you will go out and do something with it, be that a piece of choreography, a rally, or even legislation. Movement is an all-encompassing thing. Even. Those of us challenged by lack of limbs or partially cooperating "parts still understand design and the combination of design elements is analyzed in contemporary dance. Includes writing in response to readings, audio and video screenings, and performance. Some classes are devoted to creating sound, movement, and lighting.

DANCE 358 Techno Soma Kinesics II: Repositioning the Performing Body in Space through the Lenses of Digital Media (also VISST 358) (IV) (LA)

Spring. 4 credits. Attendance at dance concerts is required.

This course is the first of a two-semester sequence (the first is DANCE 495) for students in Dance. The new context of digital media (games and digital art) and Web projects. Computer and sound-production programs are examined and utilized in the class work (human form-animation software [Life Forms], vocal recording and digital editing [Protocols and Hyperprint], 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 will be examined as they are repositioned by digital-tools translation 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 utilized to support conceptual creative work.

DANCE 418 Seminar in Dance Studies (also DANCE 204 and VISST 419) (IV) (CA)

Fall and spring. 4 credits. Limited to 15 students.

DANCE 490 Senior Paper in Dance

Fall and spring. 4 credits. Prerequisite: DANCE 418, senior standing. Attendance at dance concerts is required.

Under faculty direction, the students write a senior paper in dance history, criticism, or theory.

DANIC 425 Strolling: Introduction to Dance Theory for Pedestrians

Fall. 4 credits. A. Scott.

This workshop is designed for pedestrians interested in understanding what exactly a "dance theory" can look like, sound like, and most importantly feel like. We will approach the everydayness of walking as a philosophical basis for that which we call neighbor. From this springboard, participants will investigate the accumulation of space, creation of location by bodily "consumption" of urban planning—a neighborhood, planned suburb, or gated community—through walking, "Social Life of Steps." Within the patterns of footsteps, we can quickly discern staging, songwriting even spelling (both literal and magical). We will investigate, through analytical choreography, the differences between a citizen, a resident, a consumer, a user, a neighbor, a demographic, and a neighborhood. This course is offered with the hope that you will go out and do something with it, be that a piece of choreography, a rally, or even legislation. Movement is an all-encompassing thing. Even. Those of us challenged by lack of limbs or partially cooperating "parts still understand design and the combination of design elements is analyzed in contemporary dance. Includes writing in response to readings, audio and video screenings, and performance. Some classes are devoted to creating sound, movement, and lighting.
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 250 Fundamentals of Theatre Design and Technology
THETR 151 and 251 Production Lab I and II (at least one credit of each)
Recommended for Scenic Design emphasis:
THETR 340 Theatrical Drafting and Technical Drawing Studio
THETR 351 Production Lab III (as Design Assistant)
THETR 354 Stagecraft Studio
THETR 364 Scene Design Studio

Upon admission to the program:
THETR 451 Production Lab IV (at least 1 credit)
Recommended for costume design or costume shop management emphasis:
THETR 351 Production Lab III (as Design Assistant)
THETR 356 Costume Construction Studio
THETR 366 Costume Design Studio I
THETR 371 Costume Design Studio II

Upon admission to the program:
THETR 451 Production Lab IV (at least 1 credit)
Recommended for Lighting Design or costume shop management emphasis:
THETR 252 Technical Production Studio I
THETR 351 Production Lab III (as Student Electrician)
THETR 351 Production Lab III (as Design Assistant)
THETR 362 Lighting Design Studio I

Upon admission to the program:
THETR 451 Production Lab IV (at least 1 credit)
Recommended for Sound Design emphasis:
THETR 251 Production Lab II (as Student Sound Technician)
THETR 252 Technical Production Studio I
THETR 351 Production Lab III (as Design Assistant)
THETR 368 Sound Design Studio

Upon admission to the program:
THETR 451 Production Lab IV (at least 1 credit)
Recommended for Technical Direction emphasis:
THETR 252 Technical Production Studio I
THETR 256 Technical Production Studio II
THETR 340 Theatrical Drafting and Technical Drawing Studio
THETR 351 Production Lab III (as Assistant Technical Director)
THETR 354 Stagecraft Studio

Upon admission to the program:
THETR 451 Production Lab IV (at least 1 credit)
Recommended for Stage Management emphasis:
THETR 253 or 353 Stage Management Lab I or III—two assignments
THETR 280 Introduction to Acting
THETR 370 Stage Management Studio
THETR 398 Fundamentals of Directing I

Upon admission to the program:
THETR 453 Stage Management Lab IV

Directing
Recommended for individuals interested in a directing track:
THETR 151 and THETR 251 Production Lab I and II (at least 2 combined credits)
THETR 240/THETR 241 Introduction to Western Theatre (1 Semester ONLY)
THETR 250 Fundamentals of Design and Technology
THETR 280 Introduction to Acting
THETR 398 Directing I
THETR 498 Directing II

Playwriting
Recommended for individuals interested in a playwriting track:
THETR 240/THETR 241 Introduction to Western Theatre (1 Semester ONLY)
THETR 250 Fundamentals of Design and Technology
THETR 280 Introduction to Acting
THETR 348 Playwriting
THETR 349 Advanced Playwriting

Students in the advanced undergraduate theatre program may also elect to take FILM 485 (Undergraduate Internship) in addition to or in place of one production assignment.

TURKISH
See Near Eastern Studies.

UKRAINIAN
See Department of Russian.

URDU
See Department of Asian Studies.

VIETNAMESE
See Department of Asian Studies.

VISUAL STUDIES UNDERGRADUATE CONCENTRATION

Visual Studies is a concentration that provides students with an interdisciplinary approach to visual art, media (including digital works), performance, and perception. Faculty from departments throughout the college offer courses toward the concentration, drawing on such various disciplines as the history of art, film, literary studies, psychology, theatre, and others. Requirements for the concentration include the core course, Introduction to Visual Studies (VISST 200), which introduces students to critical thinking about visual studies as well as close textual analysis in social and historical contexts. Responsibility for teaching the core course will rotate among faculty affiliated with the concentration, and the course will, as much as possible, entail interdepartmental collaboration in the form of team-teaching or visiting lectures. In addition to the core course, students must choose four Cornell courses from among the different categories of courses offered in the concentration. One of the four courses must include a significant component of practical work (such courses are listed under the category "Theory/Practice"). No more than two courses from the concentration may be double-counted toward a student's major. All courses must be taken for a letter grade.

Students interested in pursuing the concentration should discuss it with their advisors and then contact the director of the concentration. The director will register students in the concentration and assign each student an adviser selected from among the concentration’s affiliated faculty. Advisers should forward a transcript copy to the director, indicating courses completed for the concentration.

Director
Susan Buck-Moors

VISUAL STUDIES CONCENTRATION COURSE LIST

Core Course for 2004-2005

VISST 200 Introduction to Visual Studies (IV) (LA)
Spring. 4 credits. Requirements: two objective midterm exams; occasional listserv postings; two five-page papers. T. Murray.

Introduction to Visual Studies 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 will be the practical and conceptual relation of twentieth-century visual traditions (photography, cinema, video, and computing) to their historical corollaries in the arts.

The course draws on the visual traditions of both Western and non-Western societies and study texts that have defined the premises and analytic vocabularies of the visual. Through viewings, screenings, collaborative writing, and art projects, students develop the critical skills necessary to appreciate how the approaches that define visual studies complicate traditional models of defining and analyzing art objects. Guest lecturers occasionally address the class.

Concentration Categories

New Media

For description, see NES 293.

VISST 309 The Cinema and the American City (also AM ST 309) 4 credits. S. Haenni.
For description, see AM ST 309.
For description, see ART H 400.

VISST 345 American Film Melodrama (also FILM 344)
Spring. 4 credits. S. Hacenni.
For description, see FILM 344.

VISST 375 History and Theory of Commercial Narrative Film (also FILM 375)
Fall. 4 credits. Fee for screening expenses $10 (paid in class). S. Hacenni.
For description, see FILM 375.

VISST 376 History and Theory of Documentary and Experimental Film (also FILM 376)
For description, see FILM 376.

VISST 379 Modern Documentary Film History and Theory (also FILM 379)
4 credits. Prerequisite: FILM 376 is strongly recommended but not required. Fee for screening expenses $10 (paid in class). Not offered 2004-2005. D. Fredericksen.
For description, see FILM 379.

VISST 386 Cinema and Social Change (also FILM 386)
For description, see FILM 386.

VISST 410 Chinese Film (also ASIAN 410)
For description, see ASIAN 410.

VISST 433 Electronic Innovation (also ENGL 433)
For description, see ENGL 433.

VISST 435 African Cinema (also AS&RC 435 and ART H 478)
For description, see AS&RC 455.

Interdisciplinary, Intermedia Studies

VISST 202 Art, Archaeology, and Analysis (also ARCH 200, EAS 200, and PHYS 200)
For description, see EAS 200.

VISST 272 Special Topics: Digital Multi-Media
For description, see ART 272.

VISST 274/674 Introduction to Film Analysis: Meaning and Value (also FILM 274/674)
Fall. 4 credits. Limited to 40 students. Graduate students should enroll in FILM 674. D. Fredericksen.
For description, see FILM 274/674.

VISST 400 Proseminar (also ART H 400)
Fall. 4 credits. Prerequisite: History of Art Majors only. Enrollment is limited. I. Dadi.
For description, see ART H 400.

VISST 500 Dancing the Stone: Body, Memory, and Architecture (also ART H 580, ASIAN 580, and THETR 580)
Spring. 4 credits. Prerequisite: permission of instructor. K. McGowan.
For description, see ART H 580.

VISST 651 The Sexual Child (also ENGL 651 and FGSS 651)
For description, see ENGL 651.

VISST 660 Cinematic Desire (also ENGL 660)
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 2004-2005. E. Hanson.
For description, see ENGL 660.

Perception, Cognitive Studies

VISST 305 Visual Perception (also PSYCH 305)
Fall. 4 credits. Prerequisite: PSYCH 205 or permission of instructor. Limited to 20 students. J. Cutting.
For description, see PSYCH 305.

VISST 342 Human Perception: Application to Computer Graphics, Art, and Visual Display (also PSYCH 342 and COGST 342)
Fall. 3 or 4 credits. The 4-credit option involves a term paper. Prerequisite: PSYCH 101 or permission of the instructor. PSYCH 205 strongly recommended. D. Field.
For description, see PSYCH 342.

VISST 347 Psychology of Visual Communications (also PSYCH 347)
Spring. 3 credits. Limited to 15 students. Prerequisites: PSYCH 101 and permission of instructor. J. Maas.
For description, see PSYCH 347.

VISST 475 Seminar in Cinema: Cognitive Film Theory (also FILM 475 and AM ST 475)
Spring. 4 credits. Limited to 20 students. D. Fredericksen.
For description, see FILM 475.

VISST 492 Sensory Function (also BIONB 492 and PSYCH 492/692)
4 credits. Limited to 25 students. Prerequisite: a 300-level course in biopsychology, or BIONB 222 or BIOAP 311, or equivalent. Students are expected to have a knowledge of elementary physics, chemistry, and behavior. S-U grades optional. Not offered 2004-2005. B. Halpern.
For description, see PSYCH 492.

Theory and Visuality

VISST 203 Introduction to Feminist Theory (also FGSS 202)
Spring. 3 credits. D. Reese.
For description, see FGSS 202.

VISST 252 Late Twentieth-Century Women Writers and Visual Culture (also ENGL 252)
Spring. 3 credits. S. Samuels.
For description, see ENGL 252.

VISST 357 Visual Culture and Social Theory (also ART H 370, COM L 356, and GOVT 375)
Fall. 4 credits. S. Buck-Morss.
For description, see ART H 370.

VISST 395 Video: Art, Theory, Politics (also ENGL 395, THETR 395)
For description, see ENGL 395.

VISST 473 Film and Spiritual Issues (also FILM 473 and RELST 473)
For description, see FILM 473.

Performance and Visuality

VISST 233 Explorations in Movement (also DANCE 233)
Fall: 0 to 1 credit. Limited to 16 students. Attendance at dance concerts is required. J. Self.
For description, see DANCE 233.

VISST 303 Dance Technique Workshop (also DANCE 303)
0 to 1 credit. By placement only; no pre-enrollment. Attendance at dance concerts is required. Not offered 2004-2005. J. Self.
For description, see DANCE 303.

VISST 308 Modern Dance (also DANCE 308)
Fall and spring. 0 to 1 credit. By placement only; no pre-enrollment. Attendance at dance concerts is required. J. Self.
For description, see DANCE 308.

VISST 319 Music, Dance, and Light (also DANCE 319 and THETR 319)
Fall. 3 credits. A. Fogelson and E. Intemann.
For description, see DANCE 319.

VISST 445 Text Analysis for Production: How to Get from the Text Onto the Stage (also THETR 445)
Spring. 4 credits. Prerequisites: THETR 240 or THETR 291 or THETR 290 or THETR 398 or permission of instructor. Limited to 15 students. B. Levitt.
For description, see THETR 445.

VISST 446 Shakespeare in (Con)text (also THETR 446)
Fall. 4 credits. B. Levitt.
For description, see THETR 446.

Visuality and Society

VISST 245 Renaissance and Baroque (also ART H 245)
Fall. 4 credits. Each student must enroll in a section. C. Lazzaro.
For description, see ART H 245.

VISST 361 European Cultural History 1750-1870 (also COM L 352 and HIST 362)
For description, see HIST 362.

VISST 362 Impressionism in Society (also ART H 362, FGSS 361)
Fall. 4 credits. L. Meixner.
For description, see ART H 362.

VISST 363 European Cultural History 1870-1945 (also COM L 353 and HIST 363)
For description, see HIST 363.

VISST 394 The House and the World: Architecture of Asia (also ART H 395 and ASIAN 394) Spring. 4 credits. K. McGowan. For description, see ART H 395.


VISST 462 Topics in Early Modernism: America and the Machine Age (also ART H 462) 4 credits. Prerequisite: permission of instructor. Auditing is not permitted. Not open to freshmen or sophomores. Not offered 2004–2005. L. Meixner. For description, see ART H 462.

Theory/Practice

VISST 104 Introduction to World Music: Asia (also MUSIC 104 and ASIAN 192) 3 credits. 1-hour discussion to be arranged. No previous training in music required. Not offered 2004–2005. M. Hatch. For description, see MUSIC 104.


VISST 211 Beginning Dance Composition (also DANCE 210) 4 credits. Prerequisite: DANCE 102 or permission of instructor. No previous knowledge of dance required. Limited to 24 students. Not offered 2004–2005. D. Field. For description, see DANCE 210.

VISST 244 Gamelan in Indonesian History and Cultures (also MUSIC 245 and ASIAN 245) Fall and spring. 3 credits. Permission of instructor. No previous knowledge of Indonesian musical notation or performance experience required. M. Hatch. For description, see MUSIC 245.

VISST 258 Techno Soma Kinesics I: Technology and the Moving Body (also DANCE 258) Spring. 4 credits. Prerequisite: DANCE 201 or DANCE 210 (or equivalent) or permission of instructor. No freshmen. Limited to 5 students. B. Suber. For description, see DANCE 258.

VISST 325 Strolling: Introduction to Dance Theory for Pedestrians (also DANCE 325) Fall. 4 credits. A. Scott. For description, see DANCE 325.

VISST 335 Modern Western Drama, Modern Western Theater: Theory and Practice (also COM L 335 and THETR 335) 4 credits. Not offered 2004–2005. Staff. For description, see THETR 335.

VISST 358 Techno Soma Kinesics II: Technology and the Moving Body (also DANCE 358) 4 credits. Prerequisite: DANCE 258 (or equivalent) or permission of instructor. Limited to 5 students. Not offered 2004–2005. B. Suber. For description, see DANCE 358.

VISST 391 Media Studio I (also ARCH 459.1, ART 391, FILM 391, MUSIC 391, and DANCE 391) Fall. 3 credits. Prerequisite: permission of instructor and junior-level standing required, minimum FILM 377 or 277, or dance studio courses. $50 equipment fee (to be paid in class). M. Rivchin, M. Lyons, D. Borden, J. Zissovic. For description, see FILM 391.

VISST 398 Fundamentals of Directing I (also THETR 398) Fall. 3 credits. Limited to 10 students. Prerequisite: permission of instructor. Special consideration is given to students who have completed THETR 280 or intend to continue in the area of stage or screen directing. Students should see instructor one year in advance to sign up for the course. D. Feldshuh. For description, see THETR 398.

VISST 419 Seminar in the History of Dance (also DANCE 416) Fall and spring. 4 credits. J. Morgenroth. For description, see DANCE 418.

VISST 478 Intermediate Film and Video Projects, Narrative Workshop (also FILM 478) Fall. 4 credits. Limited to 8 students. Prerequisite: FILM 277 or 278. As minimum production; and THETR 383 (Screenwriting) or 398 (Directing I), and permission of instructor based on proposals. Equipment fee: $100 (paid in class). Project costs: $500–$1500. Video $100–$200. M. Rivchin. For description, see FILM 478.

VISST 493 Advanced Film and Video Projects (also FILM 493) Spring. 4 credits. Limited to 6–8 students. Prerequisite: minimum FILM 377 or 277, preference to those who have taken 477 or 478 recommended; 385 (Screenwriting) and 398 (Directing I). M. Rivchin. For description, see FILM 493.

Interdisciplinary Graduate Concentration

In the spring of 2004, Cornell began plans for an interdisciplinary graduate concentration in Visual Studies that will take several years to institutionalize. The concentration in Visual Studies is not meant to substitute for disciplinary training, which will not be waived by the addition of interdisciplinary courses. The "Course List in Visual Studies for Fall 2004" below alerts incoming students to courses that may be relevant to their interests, and aids them in discovering the network of professors working in Visual Studies, spanning multiple departments and schools at Cornell.

VISST 411 The Classical in Colonial Asia (also S HUM 410) Fall. 4 credits. A. Blackburn. For description, see S HUM 410.

VISST 413 Translating the Untranslatable (also S HUM 413) Fall. 4 credits. H. Petrovsky. For description, see S HUM 413.

VISST 421 The Multicultural Alhambra (also ART H 411) Fall. 4 credits. C. Robinson. For description, see ART H 411.

VISST 430 Americans at Play (also AM ST 430) Fall. 4 credits. S. Haenni. For description, see AM ST 430.

VISST 431 America in the Camera's Eye (also HIST 430) Fall. 4 credits. R. L. Moore. For description, see HIST 430.

VISST 456 Aesthetic Theory: End of Art (also GERST 656) Fall. 4 credits. P. Gilgen. For description, see GERST 656.

VISST 490 Art and Collecting: East and West (also ART H 490) Fall. 4 credits. K. McGowan. For description, see ART H 490.

VISST 506 Contemporary African Diaspora Art (also AS&RC 506) Fall. 4 credits. Faculty. For description, see AS&RC 506.

VISST 540 Seminar in Renaissance Art (also ART H 540) Fall. 4 credits. C. Lazzaro. For description, see ART H 540.

VISST 570 Introduction to Critical Theory (also ART H 570) Fall. 4 credits. M. Fernandez. For description, see ART H 570.

VISST 661 Visual Identity (also GERST 660) Fall. 4 credits. G. Waite. For description, see GERST 660.

VISST 665 Media Theory: Film and Photography (also GOVT 666) Fall. 4 credits. D. Rubenstein. For description, see GOVT 666.

VISST 683 From Electric to Electronic Media (also GERST 683) Fall. 4 credits. W. Kittler. For description, see GERST 683.

VISST 696 Digital Bodies, Virtual Identity (also ENGL 696) Fall. 4 credits. T. Murray. For description, see ENGL 696.

WELSH

See Department of Linguistics.

WRITING PROGRAM

See John S. Knight Institute for Writing in the Disciplines.
YIDDISH
See Department of Near Eastern Studies.

FACULTY ROSTER
FOR ARTS AND SCIENCES BIOLOGY
FACULTY SEE “BIOLOGICAL SCIENCES.”
Abel, Lynne S., Ph.D., Stanford U. Assoc. Prof., Classics
Abrahams, Weyman H., Ph.D., Harvard U. Class of 1916 Professor of English Emeritus, English
Abravanel, Hector D., Ph.D., U. of North Carolina at Chapel Hill. Emile M. Chomot Professor of Chemistry, Chemistry and Chemical Biology
Abusohl, Dorit, Ph.D., U. of Massachusetts at Amherst. Assoc. Prof., Linguistics
Adams, Anne, Ph.D., U. of Michigan. Assoc. Prof., Africana Studies and Research Center/Comparative Literature
Adams, Barry B., Ph.D., U. of North Carolina. Prof., Emeritus, English
Adams, James E., Ph.D., Cornell U. Assoc. Prof., English
Adelson, Leslie A., Ph.D., Washington U. Prof., German Studies
Ahl, Frederick M., Ph.D., U. of Texas at Austin. Prof., Classics/Comparative Literature
Alexander, James P., Ph.D., U. of Chicago. Prof., Physics/LEPP
Alkire, Elbern H., Ph.D., Cornell U. Senior Lecturer, Romance Studies
Allmendinger, Richard W., Ph.D., Stanford U. Prof., Earth and Atmospheric Sciences/INSTOC
Allmon, Warren, Ph.D., Harvard U. Adjunct Assoc. Prof., Earth and Atmospheric Sciences
Almy, James, Ph.D., U. of California at Irvine. Lecturer, Chemistry
Altshuler, Glenn C., Ph.D., Cornell U. The Thomas and Dorothy Liann Professor of American Studies, American Studies
Amhe共有or, Vinay, Ph.D., Carnegie Inst. of Technology. Goldwin Smith Professor of Physics, Physics/LEPP
Amigo-Silvestre, Silvia, M.A., U. of Oregon. Lecturer, Romance Studies
Anderson, Benedict R., Ph.D., Cornell U. Aaron L. Binenkorb Professor of International Studies Emeritus, Government
Archer, Richard J., M.A., U. of Missouri at Kansas City. Assoc. Prof., Theatre, Film, and Dance
Arias, Tomas A., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Physics/LEPP
Arms, William, Ph.D., U. of Sussex. Prof., Computer Science
Arnesen, Ingrid, M.A., U. of California at Davis. M.A., SUNY Stony Brook. Senior Lecturer, English for Academic Purposes
Arroyo, Ciriac O., M.D., U. of Munich (Germany). Prof. Emeritus, Romance Studies
Ashcroft, Neil W., Ph.D., Cambridge U. (England). Horace White Professor of Physics, Physics/LEPP
Ashmanskas, William J., Ph.D., U. of California at Berkeley. Prof., Physics/LEPP
Assié-Lumumba, N'Dri, Ph.D., U. of Chicago. Assoc. Prof., Africana Studies and Research Center
Back, Allen H., Ph.D., U. of California at Berkeley. Senior Lecturer, Mathematics
Bailey, Graeme, Ph.D., U. of Birmingham. Prof., Computer Science
Baird, Barbara, Ph.D., Cornell U. Prof., Chemistry Emeritus
Bala, Kavita, Ph.D., Massachusetts Institute of Technology. Asst. Prof., Computer Science
Baranier, Anindita, Ph.D., U. of California at Los Angeles. Asst. Prof., Comparative Literature
Baptist, Edward, Ph.D., U. of Pennsylvania. Asst. Prof., History
Bar, Talia, Ph.D., Yale U. Asst. Prof., Economics
Baraldi, Michela, B.A. equivalent, U. of Bologna. Lecturer, Romance Studies
Baranzini, Muawia, Ph.D., Columbia U. Prof., Earth and Atmospheric Sciences/INSTOC
Bartash, Dan, Ph.D., U. of Illinois. Prof., Mathematics
Barshebyian, Levon, Ph.D., Northwestern U. Asst. Prof., Economics
Bassett, William A., Ph.D., Columbia U. Prof., Emeritus, Earth and Atmospheric Sciences
Basi, Aluca, MSC, U. of London. Assoc. Prof., Sociology
Basi, Kaushik, Ph.D., London School of Economics (England). Carl Marks Prof. of International Studies, Economics
Bathrick, David, Ph.D., U. of Chicago. Prof., German Studies/Technique
Bättig von Wettelschab, Kora, M.A., University of Zagreb. Senior Lecturer, Romance Studies
Bauer, Simon H., Ph.D., U. of Chicago. Prof., Emeritus, Chemistry and Chemical Biology
Begley, Tadhg P., Ph.D., Columbia U. Prof., Technology. Prof., Chemistry and Chemical Biology
Bekerle, Ayele, Ph.D., Temple U. Asst. Prof., Africana Studies and Research Center
Bell, James F., Ph.D., U. of Hawaii. Assoc. Prof., Astronomy/CRSR
Bem, Daryl J., Ph.D., U. of Michigan. Prof., Psychology
Bem, Sandra L., Ph.D., U. of Michigan. Prof., Psychology/Feminism, Gender and Sexuality Studies
Benedetti, Lourdes, Ph.D., Columbia U. Prof., City and Regional Planning/Feminist, Gender and Sexuality Studies
Bensel, Richard, Ph.D., Cornell U. Prof., Government
Bécaud, Jacques, Doctorat d’Univ., U. of Lille (France). Prof., Emeritus, Romance Studies
Bercut, Yuri, Ph.D., Université de Montréal (Canada). Asst. Prof., Mathematics
Berезин, Mabel, Ph.D., Harvard U. Assoc. Prof., Sociology
Berger, Anne, Ph.D., Paris VII (France). Prof., Romance Studies
Berkelman, Karl, Ph.D., Cornell U. Goldwin Smith Professor of Physics, Physics/LEPP
Bernstein, Sarah E., M.F.A., Yale U. Senior Lecturer, Theatre, Film, and Dance
Berntzoch, Judith, Ph.D., Columbia U. Assoc. Prof., History of Art
Bethe, Hans, Ph.D., U. of Munich (Germany). John Wendell Anderson Professor of Physics Emeritus
Billera, Louis J., Ph.D., City U. of New York. Prof., Mathematics
Bilson, Malcolm, M.A., U. of Illinois. Frederic J. Whiton Professor of Music
Bird, John M., Ph.D., Rensselaer Polytechnic Inst. Prof., Emeritus, Earth and Atmospheric Sciences
Birman, Kenneth P., Ph.D., U. of California at Berkeley. Prof., Computer Science
Bishop, Jonathan F., Ph.D., Harvard U. Prof., Emeritus, English
Bjerken, Xak, D.M.A., Peabody Conservatory of Music. Asst. Prof., Music
Blackall, Jean F., Ph.D., Harvard U. Emerita, English
Blackburn, Anne M., Ph.D., U. of Chicago. Assoc. Prof., Asian Studies
Blacksher, Beverly, Ph.D., Cornell U. Senior Lecturer, Africana Studies and Research Center
Bloom, Arthur L., Ph.D., Yale U. Prof., Emeritus, Earth and Atmospheric Sciences
Blume, Lawrence E., Ph.D., U. of California at Berkeley. Prof., Economics
Blumins, Stuart M., Ph.D., U. of Pennsylvania. Prof., History
Bock, David, Ph.D., SUNY Albany. Senior Lecturer, Mathematics
Bodenschatz, Eberhard, Ph.D., U. of Bayreuth (Germany). Prof., Physics/LEPP
Bogel, Fredric V., Ph.D., Yale U. Prof., English
Bogel, Lynda De Need, M.Ph., Yale U. Senior Lecturer, English
Borden, David R. M.A., Harvard U. Senior Lecturer, Music
Bosseels, Bruno, Ph.D., U. of Pennsylvania. Assoc. Prof., Romance Studies
Boucher, Daniel Ph.D., U. of Pennsylvania. Assoc. Prof., Asian Studies, H. Stanley Krusen Professor of World Religions
Bowen, John S. Ph. D., Massachusetts Inst. of Technology. Prof., Linguistics
Boyd, Richard N., Ph.D., Massachusetts Inst. of Technology. Prof., Philosophy/Science and Technology Studies
Boyer, Dominic, Ph.D., U. of Chicago. Asst. Prof., Anthropology
Bracken, William F., Ph.D., Harvard U. Asst. Prof., Philosophy
Brady, Mary Pat, Ph.D., U. of California at Los Angeles. Assoc. Prof., English
Brenham, 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
Breussel, Karen W., Ph.D., Columbia U. Prof., Emeritus, Japanese Literature, Asian Studies
Briggs, Martina Arts, M.A., O.M.O. Utrecht (The Netherlands). Senior Lecturer, German Studies
Bronfenbrenner, Uriel, Ph.D., U. of Michigan. Jacob Gould Schurman Professor Emeritus, Human Ecology/Psychology
Brookhouse, Stephen Christopher, M.F.A., Virginia Tech. Senior Lecturer, Theatre, Film and Dance
Brouwer, Piet, Ph.D., Leiden U. Assoc. Prof., Physics/LEPP
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 at Berkeley. Prof., English
Browne, E. Wayles, Ph.D., U. of Zagreb (Croatia). Assoc. Prof., Linguistics
Brumback, Joan Jacobs, Ph.D., U. of Virginia. Prof., Emeritus, Earth and Atmospheric Sciences
Burrell, Bonnie, Ph.D., Cornell U. Senior Lecturer, German Studies
Buck-Morss, Susan F., Ph.D., Georgetown U. Prof., History of Art
Buck-Morss, Susan F., Ph.D., Georgetown U. Prof., History of Art
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Buck-Morss, Susan F., Ph.D., Georgetown U. Prof., History of Art
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<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Position/Institution</th>
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<tbody>
<tr>
<td>Bunce, Valerie, Ph.D.</td>
<td>U. of Michigan</td>
<td>Prof., Government</td>
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<tr>
<td>Buritch, James M., Ph.D.</td>
<td>Massachusetts Institute of Technology</td>
<td>Prof., Chemistry and Chemical Biology</td>
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<td>Burns, Joseph A., Ph.D.</td>
<td>Cornell U. Irving</td>
<td>Porter Church Professor of Engineering, Astronomy/Theoretical and Applied Mechanics/GRSR</td>
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<td>Caldwell, Steven B., Ph.D.</td>
<td>Cornell U. Assoc.</td>
<td>Sociology</td>
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<td>Campbell, Timothy C., Ph.D.</td>
<td>Columbia U.</td>
<td>Prof., Romance Studies</td>
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<td>Campos, Michelle, Ph.D.</td>
<td>Stanford U. Asst. Prof., Near Eastern Studies</td>
<td>Asst. Prof.</td>
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<td>Carden, Patricia J., Ph.D.</td>
<td>Columbia U.</td>
<td>Emeritus, English/Comparative Literature</td>
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<td>Carlson, Allen, Ph.D.</td>
<td>Yale U. Asst. Prof., Government</td>
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<td>Carmichael, Calum M., LL.D., Glasgow U.</td>
<td>Scotland.</td>
<td>Prof., Comparative Literature/Biblical Studies</td>
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<td>Caron, Vicki, Ph.D.</td>
<td>Columbia U. Prof., Thomas and Diann Mann Chair in Modern Jewish Studies</td>
<td>History/Jewish Studies Program</td>
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<td>Carpenter, Barry K., Ph.D.</td>
<td>College, London (England)</td>
<td>Prof., Chemistry and Chemical Biology</td>
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<td>Carrillo, Loretha, Ph.D.</td>
<td>Michigan State U.</td>
<td>Senior Lecturer, Romance Studies/Latino Studies</td>
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<td>Carroll, Noel, Ph.D.</td>
<td>U. of Illinois Assoc. Prof., Theatre Arts/Philosophy</td>
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<td>Casana, Richard, Ph.D.</td>
<td>Carnegie Mellon U. Asst. Prof., Computer Science</td>
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<td>Cates, H. Floyd, Ph.D.</td>
<td>U. of California at Brook. Lecturer, Theatre, Film &amp; Dance</td>
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<td>Chignell, Andrew, Ph.D.</td>
<td>Yale U. Asst. Prof., Philosophy</td>
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<td>Chirik, Paul J., Ph.D.</td>
<td>California Institute of Technology</td>
<td>Prof., Chemistry and Chemical Biology</td>
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<td>Christiansen, Morten, Ph.D.</td>
<td>U. of Edinburgh</td>
<td>U.K. Asst. Prof., Psychology</td>
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<td>Clark Arcadi, Adam, Ph.D.</td>
<td>U. of Michigan</td>
<td>Asst. Prof., Anthropology</td>
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<td>Clinton, Kevin M., Ph.D.</td>
<td>Johns Hopkins U.</td>
<td>Prof., Chemistry and Chemical Biology</td>
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<td>Coate, Stephen, Ph.D.</td>
<td>Northwestern U. Kiplinger Professor of Economic Policy, Economics</td>
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<td>Coates, Geoffrey, Ph.D.</td>
<td>Stanford U. Prof., Chemistry and Chemical Biology</td>
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<td>Coren, Devra, Ph.D.</td>
<td>U. of Michigan</td>
<td>Asst. Prof., Government</td>
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<td>Cornell, John E., Ph.D.</td>
<td>U. of Cincinnati.</td>
<td>Prof., Computer Science</td>
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<td>Collins, Christopher T., Ph.D.</td>
<td>Massachusetts Inst. of Technology</td>
<td>Prof., Linguistics</td>
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<td>Collum, David B., Ph.D.</td>
<td>U. of California</td>
<td>Prof., Chemistry and Chemical Biology</td>
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<td>Conley, Thomas F., Ph.D.</td>
<td>U. of Waterloo</td>
<td>Prof., Computer Science</td>
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<td>Connelly, Robert, Ph.D.</td>
<td>U. of Michigan</td>
<td>Prof., Mathematics</td>
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<td>Conly, Alan, Ph.D.</td>
<td>U. of Illinois</td>
<td>Class of 1916 Professor, English/Comparative Literature</td>
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<td>Corson, Dale R., Ph.D.</td>
<td>U. of California</td>
<td>Prof., Emeritus, Physics/LASSP*</td>
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<td>Cottrell, Robert M., Ph.D.</td>
<td>Berkeley.</td>
<td>Prof., Emeritus, Physics/LASSP*</td>
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<td>Cowden, Jonathan, Ph.D.</td>
<td>Yale U. Asst. Prof., Government</td>
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<td>Crane, Brian R., Ph.D.</td>
<td>The Scripps Research Institute</td>
<td>Asst. Prof., Chemistry and Chemical Biology</td>
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<tr>
<td>Cross, Warren Dennis, B.A.</td>
<td>SUNY Stony Brook</td>
<td>Lecturer, Theatre, Film &amp; Dance</td>
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